HOUSE OF COMMONS
CANADA

PRODUCTIVITY AND INNOVATION: A COMPETITIVE AND PROSPEROUS CANADA

Report of the Standing Committee on Industry

Susan Whelan, M.P.
Chair

April 2000

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has the honour to present its

FOURTH REPORT

Pursuant to Standing Order 108(2), the Standing Committee on Industry proceeded to a study on Productivity, Innovation and Competitiveness. After hearing evidence, the Committee has agreed to report to the House as follows:

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CHAIR'S FOREWORD

In October 1997, the House of Commons Standing Committee on Industry began a long-term study leading to a series of reports on innovation, productivity and competitiveness. This study was initiated in response to Sustaining Canada as an Innovative Society: An Action Agenda, a document written by several research groups for the Government of Canada and which had raised important questions with respect to the quantity and quality of scientific research being undertaken in this country. The Association of Universities and Colleges of Canada, the Canadian Association of University Teachers, the Canadian Consortium for Research, the Humanities and Social Sciences Federation of Canada, and the Canadian Graduate Council described the situation as one of underfunding of basic research that presented a danger to Canada's long-term innovative capacity and, ultimately, to its citizens' standard of living.

In June 1999, the Committee answered the challenge laid out by these groups in its Nineteenth Report, entitled Research Funding: Strengthening the Sources of Innovation, wherein it made 16 recommendations for improving the planning, effectiveness and efficiency of research activities in Canada. While the Committee is satisfied that its report addresses the science, research and development (R&D) aspects of product and process innovation, it remains sceptical that R&D alone will solve all our industrial innovation problems. The Committee holds this view for three reasons. First, organizational and institutional innovation which are as important as product and process innovation and complementary to it, are not directly affected by federal R&D funding and effort levels. Second, competition is also an important ingredient of innovation; in fact, competition is probably the single leading catalyst in all types of innovation and, unless it is present, R&D incentives will be of little consequence. Finally, as most experts in the field understand, innovation is not an end in itself, but a means to an end. The Committee does not seek change for the sake of change, but for what prosperity might result.

An innovative society is a dynamic society, but it is less sure that a dynamic society will also necessarily be prosperous. Matters other than R&D are involved in this determination, and we must, in the end, seek an optimal mix of all influential factors in order to preserve Canada as a prosperous nation. Ultimately, the Committee wants to address industry's sway over the Canadian standard of living, but to do so it must explore not only innovation, but also productivity and competitiveness, which are quintessential building blocks of a prosperous society.

The Committee was aware from the outset that the House of Commons Standing Committee on Finance had looked into productivity. I, on behalf of this Committee, would like to compliment our colleagues for their excellent report of June 1999: Productivity with a Purpose: Improving the Standard of Living of Canadians, which embodies tremendous work and very insightful conclusions. Rather than duplicating their efforts, this Committee sought to produce a complementary study that would focus on the relationship between productivity and the competitiveness of the Canadian business sector, as well as analyze certain sectors where we might find specific signs of strength or weakness. This microscopic perspective should cast a different light from that revealed by the telescopic perspective of the Finance Committee. Since it is from the to and fro of intense competition between corporations for customer loyalty, entrepreneurial capital, competent management and productive labour that Canadians derive their standard of living, a detailed study of industry best practices may be revealing. Furthermore, there is a good chance that most productivity problems in Canada are neither widespread nor similar across the business sector, but are instead specific to a subset of industries or are confined within certain areas or business practices relating to competitiveness. In this case, this Committee's targeted approach should be more helpful and amenable to finding the most effective solutions.

The Committee thus embarked on its study of productivity in November 1999 in order to better understand the role this plays in the domestic and international competitiveness of the Canadian business sector. In the time available, from November 1999 to March 2000, the Committee structured its hearings in such a way as to hear from as many experts on productivity as possible. The roundtable format chosen by the Committee allowed for a fluid and often fascinating debate of the principal issues at stake. These included comparing Canada's recent productivity performance with that of the past and that of others, most notably the United States; and examining the specific circumstances of the manufacturing and small and medium-sized business sectors; the impact of physical and human capital investment on productivity, economic growth and the standard of living; the effects of R&D, innovation and technical progress; as well as business and personal taxation, and regulation, competition and trade policy frameworks. In a unique way, the Committee also introduced into the mix the most recent eco-efficiency debate, wherein some very influential researchers have argued that the traditional economic-environment trade-off will no longer exist, or at least will be attenuated, in the innovative, knowledge-based economy to which we increasingly appear headed. The Committee then chose to explore and apply what it learned from these roundtable discussions to critical sectors of the Canadian economy: agriculture and agri-food, natural resources, refined petroleum products, shipbuilding, automotive and aerospace manufacturing, information and communications technologies and, finally, biotechnology.

In the end, 74 witnesses appeared before the Committee. These Canadians clearly had a great deal to say about productivity, innovation and competitiveness, as they cleverly articulated well-reasoned views and opinions. It is perhaps because Canada has, since its inception, been both a trade partner and competitor country of its large and productive neighbour to the south that its academics, think-tank professionals and business leaders are so well informed on matters of productivity and competitiveness. The evidence provided to the Committee makes quite clear that the industrious character of the United States provides a perennial source of rivalry that challenges Canadian industry and spurs it forward. While there exist interesting and diverse opinions on productivity and its influence on competitiveness, these views, much to the Committee's surprise, were less divergent than expected. Consensus on productivity-related issues was therefore within the Committee's immediate grasp and this report reflects the in-depth knowledge and advice of Canada's experts in this area. At this time, I would like to thank those who participated in our extensive hearings process and for sharing their insights with us. I am confident that the public will agree that this report reflects both their concerns and common Canadian values and priorities in our ever-evolving and productive economy.

PREFACE

For most of this century the standard of living in Canada steadily and impressively improved in lock step with that of the United States. The pace and duration of this progression was by no small feat. Indeed, from the end of World War II to 1973, the halcyon days of wealth creation in Canada, our standard of living as measured by gross domestic product (GDP) per capita could be counted on to double every generation. Since 1973, however, the growth in the Canadian standard of living has been lethargic to say the least, with doubling now expected only every century. The general consensus was that the fall in the growth in the standard of living of most industrialized countries took place in tandem with that in the growth in labour productivity. This would normally be reason for concern but, because most countries of the industrialized world experienced a similar decline, not much was made of it by the Canadian public or, for that matter, Canadian policy-makers. Hence, the answer to what amounted to a near global problem was regarded to lie beyond the grasp of any single nation-state and as being, perhaps better dealt with in a wider cooperative forum, such as that of the G-7 countries.

That the productivity slowdown in the industrialized market economies coincided with the two energy crises orchestrated by OPEC in the early- and late-1970s seems rather obvious today. What sustained this deceleration through the 1980s and 1990s remains open to interpretation, however. Two types of explanations are proffered. The first points to the rate of capital investment, particularly in machinery and equipment, which slowed down considerably in this period. The lower rates of investments stemmed the flow of productivity improvements resulting from a higher capital-to-labour ratio and slowed the decline in the average age of the capital stock. Industry has, therefore, increasingly had to rely on vintage technologies that lacked the same measure of technical progress and innovation of previous periods. The second explanation points to the disproportionate investments made in computer hardware and software; these are believed to be profoundly revolutionary and beneficial, but have not yielded improved productivity because the complementary organizational and institutional adjustments are only now beginning to be implemented. It has been suggested that when this second phase of the revolution is well underway, our productivity woes will be a thing of the past. We could, therefore, be on the cusp of a productivity boom in which the Information Revolution is likely to be as powerful and relentless as the early stages of the Industrial Revolution.

The Canadian perspective, however, is more tentative. Since 1995, market watchers in Canada have observed three disturbing economic developments. Traditionally, Canada's business cycle had always been well synchronized with that of the United States, with peaks and troughs never more than three months apart in the two countries. Canada never experienced a recession between 1900 and 1980 without corresponding recessions in the United States being more severe than those in Canada. However, after the 1980s, economic history did not unfold according to this script. The 1981-82 and 1990-92 recessions were both more severe in Canada than in the United States and the 1992-99 economic recovery has been sluggish in Canada, while robust in the United States. Consequently, Canada's unemployment rate has been relatively high throughout the decade, while that of the United States has improved to an enviable 4%, well below the accepted non-accelerating inflation rate of unemployment (NAIRU) for the period, yet without simultaneously igniting inflation. This superior economic performance suggests that both American productivity and standard of living are enjoying a renaissance at a time when the productivity and standard of living in most West European and selective Southeast Asian countries have also been catching up to those of the United States.

Apparently, Canada has not been invited to this party, a fact that has not gone unnoticed by the Canadian public.

A Canadian economy that underperforms relative to that of the United States is reason for concern. Clearly, an explanation for a seemingly widening gap between the standard of living of Canadians and Americans is needed, and factors on both demand and supply sides of the economy are suspect. Since the mid-1990s, the Government of Canada has, along with most provincial governments, taken decisive action to eliminate low priority expenditures, leading to the elimination of budget deficits and the paydown of the accumulated debt. The resultant low employment and labour force participation rates are likely contributors to the sluggishness of the economy and, therefore, to a less than stalwart improvement in our standard of living. From the supply side, possible culprits are a relatively slow rate of investment in machinery and equipment and diffusion of the newest best practice technologies, along with the slow development of new products and services, particularly in the rapidly growing sectors of the economy characterized as high-tech or knowledge-based and in small and medium-sized businesses.

While the prudent macroeconomic policies observed in the past few years can be criticized for having restricted the growth of the economy for some time now, in some sense they can also be credited for setting the foundation for a prosperous future. Canadians have had to sacrifice a lot in recent austere times, but the economic recovery is now picking up steam; the national unemployment rate, now at 6.8%, is standing at a quarter century low, inflation and interest rates are low in comparison to similar periods in our history and we have a declining debt-to-GDP ratio. Given these strong macroeconomic fundamentals, the Government of Canada has marked a new era of fiscal surpluses with Budget 2000, which proposes broad-based tax cuts for Canadians and Canadian businesses over the next five years. Undoubtedly, Canada's fiscal house has been put in order and the Government of Canada can now focus its attention on the country's long-term economic challenges, of which none can be more important than the reported lacklustre productivity performance. To this end, the Government of Canada wasted no time in introducing its innovation agenda in Budget 2000, which includes a $1.9 billion investment in research and innovation over the next four years.

While Budget 2000 will provide a significant boost to innovation and, ultimately, to productivity in Canada, it is in the spirit of sustaining this momentum that the Committee is conducting a study of productivity and innovation, fundamental components of a competitive and prosperous society. The overwhelming historical evidence points to the fact that visionary entrepreneurs built extensive business organizations and trading networks on these very two wealth-creating footings. The chronicles also single out an industrious and well-equipped labour force for its contributions to founding a modern and dynamic society. Often overlooked in the many commercial success stories of our country is the role played by the nation's government. Thriving business ventures cannot come about in countries with poor social capital. This Committee is therefore reviewing Canada's productivity performance, investigating its determinants and probing for obvious strengths and weaknesses of the business sector, including specific industry segments. This approach will enable the Committee to recommend constructive industrial policies addressing particular problem areas and facilitating the country's transition to a knowledge-based society. Economic growth, fuelled by increases in productivity, will be pivotal in obtaining a higher standard of living and closing the apparent gap between Canada and the United States. In the end, the Committee's primary objective is to provide the Government of Canada with guidance on industrial policies that will boost the nation's productivity, innovation and international competitiveness.

COMMITTEE RECOMMENDATIONS

CHAPTER 1:

CANADIAN PRODUCTIVITY AND INTERNATIONAL COMPARISONS

1. **That the Government of Canada broaden its innovation agenda as setout in *Budget 2000* with the objective of raising the business sector's productivity growth rates above the average posted by the G-7 countries on a consistent year-to-year basis.**

2. **That the policy initiatives flowing from the Government of Canada's innovation agenda be designed to provide an advantage for the manufacturing and small and medium-sized business sectors.**

CHAPTER 2:

PRODUCTIVITY IN INDUSTRIALIZED ECONOMIES: WHAT HAPPENED POST-1973?

3. **That the Government of Canada design its industrial policies to stimulate business sector investment in physical capital, in particular machinery and equipment, with the aim of raising Canada's investment rate above that of the G-7 country average.**

4. **That the Government of Canada in cooperation with the provinces and municipalities increase investment in public infrastructure in transportation networks.**

5. **That the Government of Canada improve data collection on productivity and its measurement in the services sector and communicate to Canadians the importance of productivity to quality of life.**

CHAPTER 3:

PRODUCTIVITY IN CANADIAN MANUFACTURING: WHAT WENT WRONG? WHAT WENT RIGHT?

6. **That the Government of Canada ensure that the application process for research and development tax credits by small and medium-sized businesses is streamlined and made user friendly.**

7. **That the Government of Canada perform an information and demonstration service for Canadian businesses with respect to emerging and new technologies and processes with the objective of facilitating their transfer and adoption in Canada.**

8. That the Government of Canada provide incentives for technology adoption that are specifically designed to enhance innovation in the manufacturing sector and in small and medium-sized businesses.

CHAPTER 4:

SMALL AND MEDIUM-SIZED BUSINESSES

9. That the Government of Canada study the corporate tax regime, including *Budget 2000* proposals, in terms of the incremental tax burden it may impose on small and medium-sized businesses. The objective of the study would be to ensure that Canadian entrepreneurs do not face a stiff tax penalty for growing their businesses and thus retain the incentive to contribute further to the Canadian economy.

CHAPTER 5:

PRODUCTIVITY, COMPETITIVENESS AND PROSPERTY

10. That the ministers of Industry and Finance jointly undertake a study of the floating Canadian dollar as it applies to the Canadian economy, devoting specific attention to its impact on the productivity and competitiveness of Canada's business sector.

CHAPTER 6:

ECONOMIC FORCES DRIVING PRODUCTIVITY

11. That the Government of Canada pursue with the provinces an improved agreement on internal trade that would remove remaining barriers to interprovincial trade and include a dispute-settlement mechanism and enforcement provisions modeled on those of the North American Free Trade Agreement, but adapted to the national context.

12. That the Government of Canada modernize its legislative framework in the financial services sector with the objective of enhancing productivity.

13. That the Government of Canada evaluate the existing restrictions on foreign ownership imposed on the business community on a sector-by-sector basis and conduct an economic analysis of their benefits and costs.

14. That the Government of Canada review its regulatory and administrative processes for any impediments they may impose on investors in Canada and remove them when contrary to the public interest.

CHAPTER 7:

INNOVATION, INNOVATION SYSTEMS AND INTELLECTUAL PROPERTY

15. That the Government of Canada's innovation agenda commit to a five-year plan of increasing expenditures for research and development, ensuring that all of these increases are larger than the expected rate of inflation, with the objective of reinforcing the upward trend in Canada's R&D-to-GDP ratio established in the 1990s and to raise it above the G-7 country average.

16. That the Government of Canada strengthen our national policy on intellectual property to achieve, at a minimum, a standard consistent with our international commitments with the objective of encouraging investment and innovation.

CHAPTER 8:

HUMAN CAPITAL

17. That the Government of Canada establish an immigration pilot project for facilitating the entry of foreign skilled workers to address labour shortages in the manufacturing sector.

18. That the Government of Canada actively pursue the integration of lifelong learning as a cooperative venture of labour, industry and government to assure the continued growth of the skill, ability and knowledge of Canadians for and in the workplace.

19. That the Government of Canada assess the merits of establishing a lifelong learning education savings plan that would permit individuals and/or their employers to contribute, on a tax-free basis, towards work skills training and education.

CHAPTER 9:

MACROECONOMIC CONDITIONS AND TAXATION

20. That the Government of Canada review and assess its capital cost allowance regulations for manufacturing and processing equipment for the purpose of ensuring that the implied rate of depreciation accurately reflects the useful economic lives of these assets.

21. That the Government of Canada, in the event of good fiscal fundamentals over the next few years, dramatically raise personal income tax brackets, as well as the basic personal exemption.

22. That the Government of Canada reduce capital gains taxes by further lowering, to one-half, the inclusion rate of capital gains subject to tax.

CHAPTER 10:

ECO-EFFICIENCY AND THE KNOWLEDGE ECONOMY

23. That the Government of Canada place greater emphasis on encouraging the adoption of eco-efficient management techniques by industry through: (1) promoting environmental management systems, including ISO 14001 standards throughout the supply chain of major economic sectors; (2) improving environmental labelling and consumer information; (3) encouraging the development and diffusion of eco-efficient technologies and products through the use of programs that support research and development and commercialization; and (4) promoting education and awareness of eco-efficient measures such as benchmarking products and production processes for their eco-efficiency, as well as providing such analysis for small and medium-sized businesses.

CHAPTER 11:

THE AGRICULTURE AND THE AGRI-FOOD AND BEVERAGE PROCESSING SECTORS

24. That the Government of Canada consult with agricultural stakeholders on building an enhanced agriculture and agri-food policy that would provide price and income support for the farming community to allow for continuous productivity improvements.

CHAPTER 12:

THE FOREST PRODUCTS SECTOR

25. That the Government of Canada take the position that there be no renegotiation of the Softwood Lumber Agreement with the United States at the expiry of the existing agreement.

CHAPTER 13:

THE MINERAL AND METAL PRODUCTS SECTOR

26. That the Government of Canada consult with the Mining Association of Canada, the Prospectors and Development Association of Canada and the Canadian mining industry to clarify the definition of the Canadian Exploration Expenses and make flow-through share investments more attractive for potential investors.

CHAPTER 14:

THE OIL AND GAS SECTOR

27. That the Government of Canada expedite consultation with First Nations regarding resource sharing and management, including land access issues, as well as provide stewardship in resolving outstanding Aboriginal treaty claims in key oil and gas resource areas of the country.

CHAPTER 15:

THE PETROLEUM PRODUCTS SECTOR

28. That the Government of Canada ensure that any future environmental regulations imposed on the formulation of petroleum products, particularly gasoline, be at least as rigorous as those of the state of California in terms of both the standards set and the industry's timetable for compliance.

CHAPTER 16:

THE SHIPBUILDING SECTOR

29. That the Government of Canada seek the repeal of the so-called Jones Act of the United States or seek an amendment to it that would provide an exception for Canadian built, manned or repaired vessels.

30. That the Government of Canada consult with all stakeholders of the shipbuilding industry to adopt and modify industrial policies that would assist shipbuilders in capturing niche markets.

CHAPTER 17:

THE AUTOMOBILE SECTOR

31. That the Government of Canada provide incentives to gain a greater percentage of the automobile research and development activity for Canada.

CHAPTER 18:

THE AEROSPACE SECTOR

32. That the Government of Canada seek bilateral negotiation and resolution of the aerospace dispute with Brazil in advance of any appelate ruling by the World Trade Organization.

CHAPTER 19:

THE INFORMATION AND COMMUNICATIONS TECHNOLOGIES SECTOR

33. That the Government of Canada provide leadership in its regulatory policies, ensuring the protection of privacy and security for Canadians while introducing competition in and between information and communications products and technologies.

34. That the Government of Canada: (1) establish Canada's brand in e-business domestically and globally; (2) accelerate the transformation of existing business in Canada; (3) foster e-business creation and growth; (4) expand the e-business talent pool in Canada; (5) make government online a major priority; and (6) build Canada's leadership in international Internet policy development.

35. That the Government of Canada encourage greater investment in both public and private telecommunications infrastructure, particularly for the more remote communities and regions of the country.

CHAPTER 20:

THE BIOTECHNOLOGY SECTOR

36. That the Government of Canada provide more funding for health and environmental research on genetically engineered and modified foods and new pharmaceutical products.

INTRODUCTION

Overview

For most of this century Canadians have seen their standard of living improve steadily and at a breathtaking pace comparable to that of the United States. Canada emerged from World War II as the second wealthiest industrialized country of the world. Indeed, those who look beyond the economic data to measure well-being, which would further include other social indicators such as health and education, often conclude that Canada is the best nation in which to live. Canada's well-crafted social union, based on the principle of sharing our economic success between regions, provinces and people, certainly deserves much credit for this situation.

Our position atop this social pyramid is, however, being challenged by other nations. In the fundamental shift from the "old economy," based on natural resource exploitation and industrial size and might, to the "new economy," based on innovation and human knowledge and creativity, the underpinnings of economic success are changing rapidly. "Out with the old" is prosperity built on inherited wealth and organizational size and scope. "In with the new" is prosperity built on innovative capacity and organizational adaptability and nimbleness. The new formulas for economic success being devised by corporate and government leaders across the world are fundamentally different from predecessor strategies.

Since the 1990s, however, Canada has seen its standard of living erode by comparison with that of other advanced countries, such as West European states, selective Asian Tiger nations and, in this decade, even the United States, as a result of declining growth in our relative productivity. Canada, at the start of the third millennium, has been slower to adapt its institutional matrix to the new economic environment than have its chief competitor countries. As a result, we depend too heavily on our cheap dollar for a competitive advantage in world markets and we risk losing both our longstanding richesse and the ability to redistribute it.

In light of these recent developments, this Committee has taken up the challenge of charting a new economic course for Canada. We aim to propose new industrial policies that will successfully take us from our industrial past to the globalized and innovative society of the future. Change by definition means disruption, but the proposals put forth by this Committee, as laid out in its 36 recommendations, should make the passage as untumultuous as possible. Canada starts off with a well-educated labour force and a strong corporate culture; so the important pieces of the puzzle are right before our eyes and all we have to do is put them together in a coherent fashion. We propose a broad productivity agenda, including an innovation component, that will establish a solid industrial policy framework for a knowledge-based economy on which to sustain Canada as a prosperous country.

The Plan

This report is divided into three parts: The Canadian Productivity, Competitiveness and Prosperity Record; Strategic Directions for Improving Productivity in a Knowledge-Based Economy; and

Productivity and Competitiveness of Selective Agricultural and Industrial Sectors. These are followed by the Committee's conclusions, which have been drawn from all three parts of the report. The report also contains three appendices: the first provides background information on various productivity definitions and related measurement issues. The next two provide the standard report documentation; that is, the witnesses appearing before the Committee and submissions received by the Committee. It is suggested that those readers, who are not well versed in the definitional and measurement issues of productivity, review Appendix 1 before going on to the rest of this report.

The Canadian Productivity, Competitiveness and Prosperity Record

Part 1 of this report provides a detailed historical account of productivity, competitiveness and prosperity, including the links between them, over the past three decades. Chapter 1 presents Canada's labour productivity and multifactor productivity performances since 1966 and compares these against the performances of other G-7 countries. Three disturbing trends are revealed: (1) a virtual worldwide decline in productivity since 1973; (2) a growing productivity gap in manufacturing between Canada and the United States; and (3) a poor productivity performance by small and medium-sized enterprises (SMEs) in this country.

Chapter 2 takes up the challenge of explaining the worldwide decline in productivity growth since 1973. It identifies as the contributing factors a global trend to lower rates of capital formation and what appears to be a delayed response to investments made in information and communications technologies. In looking at why the productivity gap between Canada-United States manufacturing sectors has grown since 1977, Chapter 3 discovers both a widening innovation gap between the two countries and a more depressed capital investment rate in Canada than the United States. Chapter 4 addresses innovation and productivity issues related to SMEs. Finally, Chapter 5 provides the linkages between productivity, competitiveness and prosperity, highlighting Canada's relative performance in each of these areas over the past three decades. Canada fared well in terms of cost competitiveness with the United States, but our heavy reliance on a depreciating currency appears to be a risky strategy as is reflected in the slide in Canada's standard of living compared to that of other G-7 countries.

Strategic Directions for Improving Productivity in a Knowledge-Based Economy

Part 2 of this report focuses on the economic factors driving productivity growth, particularly those that are becoming more important in an increasingly knowledge-based economy. Chapter 6 identifies eight key drivers of productivity and describes five of these; leaving the remaining three, seen as critical to a knowledge-based economy, to be dealt with in specific chapters that follow. The productivity drivers discussed in Chapter 6 include natural resource exploration and development, international trade and interprovincial commerce, domestic investment and foreign direct investment, organizational capabilities and corporate strategies of the business sector, and regulation and competition policy frameworks.

Chapter 7 concentrates on the primary activity of a knowledge-based economy: innovation. It suggests that we are in the midst of an innovation boom that is fuelled by information and communications technology developments and will soon be reinforced by important biotechnology advances. National innovation systems in Canada are profiled, as is an R&D strategy for a knowledge-based economy; finally, the chapter discusses the importance of providing greater protection for intellectual property, particularly patents. Chapter 8 focuses on the primary resource of a knowledge-based economy: human capital or knowledge. Discussed are the education, skills training and lifelong learning needed for the new work environment, "brain drain" facts and issues, and management-labour relations. Chapter 9 looks at taxation – the primary policy lever of a knowledge-based economy (and all economies) – beginning with a discussion of macroeconomic conditions and the proper path for economic stabilization. This chapter moves on to a discussion of the more important components of the federal taxation system – corporate, personal and capital gains – in terms of their impact on productivity. While praising some of the announced changes to the tax system in Budget 2000, the Committee presses for additional measures. Finally, Chapter 10 introduces into the mix the most recent eco-efficiency debate, wherein some very influential researchers argue that the traditional economic-environment trade-off will no longer exist, or at least will be attenuated, in an innovative, knowledge-based economy through investments and innovations that raise productivity while lessening the environmental impact of economic activity.

Productivity and Competitiveness of Selective Agricultural and Industrial Sectors

Part 3 provides an overview of productivity and competitiveness in Canada by sector. The sectors include: agriculture, forestry, mining, oil and gas, petroleum products, shipbuilding, automotive and aerospace manufacturing, information and communications technologies, and biotechnologies. Chapters 11 through 20 set out these sectors' economic contributions and their structure, productivity and competitiveness criteria and performance, an industry outlook, and policy-related issues.

Conclusion

The conclusion recapitulates Canada's record of productivity, competitiveness and standard of living and reinforces the Committee's principal recommendations. The Committee is convinced that these will revitalize Canada's productivity and bring our relative standard of living rankings back to levels of the 1960s. Canada's near-top world ranking can be restored. Our recommendations will also better prepare Canadians and Canadian businesses for the opportunities and challenges of a knowledge-based economy. Our vision of Canada is one in which we exchange our quaint image as "hewers of wood and drawers of water" for one that is innovative and productive. The result will be a competitive and prosperous Canada.

PART I:

THE CANADIAN PRODUCTIVITY COMPETITIVENESS AND PROSPERITY RECORD

CHAPTER 1: Canadian Productivity and International Comparisons

CHAPTER 2: Productivity in Industrialized Economies: What Happened Post-1973?

CHAPTER 3: Productivity in Canadian Manufacturing: What Went Wrong? What Went Right?

CHAPTER 4: Small and Medium-Sized Businesses

CHAPTER 5: Productivity, Competitiveness and Prosperity

CHAPTER 1:

CANADIAN PRODUCTIVITY AND INTERNATIONAL COMPARISONS

The Canadian Productivity Record

A useful start to the study of productivity is to provide a definition of the term, since, beyond the commonly held impression that it must involve some form of work that contributes to the creation of a product, it is not universally understood. The Committee thus accepts the general interpretation put to it that productivity is one of a number of key indicators of the vitality or strength of an economy; it measures the relationship between the physical volume of goods and services produced and the resources used in the production and transactions processes adopted by that economy.[1] As one witness told the Committee:

> Productivity is the measure of the efficiency with which people, capital, resources, and ideas are combined in the economy. The key word here is "efficiency." [Serge Nadeau, Industry Canada, 2:9:25]

There are two widely accepted measures of productivity. The most easily understood measure of these is labour productivity, which is simply the amount of output produced by an economy divided by the amount of labour employed (either in terms of working persons or hours worked) in that economy. Another useful definition, known as the multifactor productivity measure, "bundles labour, capital, and intermediate inputs together into a single input measure" [John Baldwin, Statistics Canada, 2:9:05]. The choice between the two measures is usually governed by the intended use. It was suggested to the Committee that "labour productivity is a superior measure of productivity if you're looking from the point of view of living standards" [Andrew Sharpe, Centre for the Study of Living Standards, 8:9:25]. On the other hand, the multifactor productivity measure is better when reviewing resource allocation decisions.

Referring to Statistics Canada data, labour productivity, as measured by gross domestic product (GDP) in constant 1992 dollars per hour worked, amounted to $26.40 in 1976; by 1998, average labour productivity was $32.84. While this performance, on the face of it, points to increasing labour productivity levels in the economy over the past 25 years, the implied average annual growth rate does not appear stellar. Labour productivity in the manufacturing sector, by comparison, was $20.52 in 1976, but in 1998 it was $29.54. The manufacturing sector thus displayed considerably more growth in productivity in the 1976-98 period than did the economy as a whole. The closing of the productivity gap between the manufacturing sector and the overall economy can, in part, be attributed to free trade, as will be discussed in Chapter 3.

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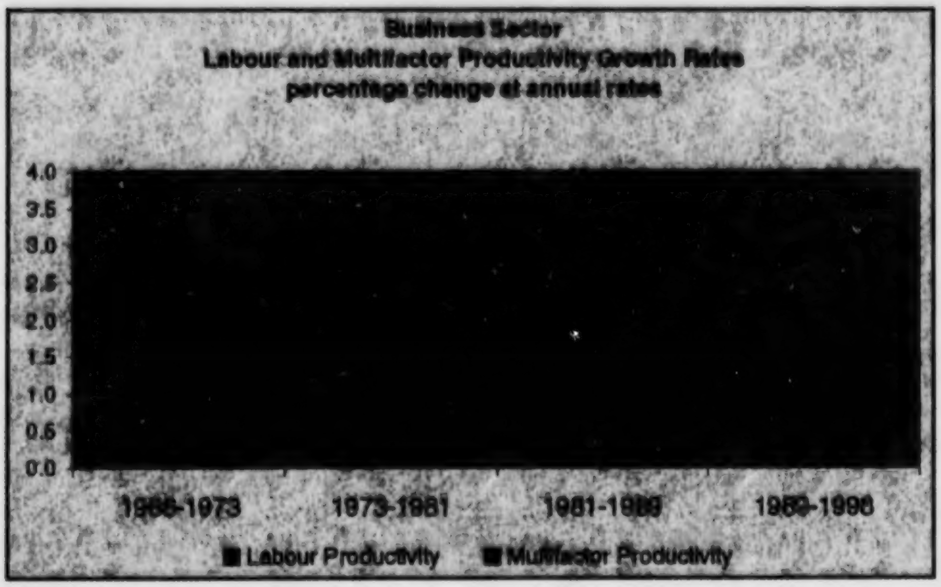
[1] For more detail on its definition and measurement, see Appendix 1.

In any event, Figure 1.1 better captures the rates of growth of both productivity measures in the business sector since 1966. The data are divided into four periods commensurate with the business cycles experienced by Canada over this time, in order to eliminate any cyclical bias in the numbers. The trends in both measures are similar. Between 1966 and 1973, Canada enjoyed a favourable rate of growth in productivity, approaching 4% per annum in terms of labour productivity and 2% in terms of multifactor productivity. Since this time, however, Canada's growth in productivity has hovered about the 1% level. In the words of one witness appearing before the Committee:

From the 1950s to the mid-1970s we had a tremendously high rate of growth of productivity … Since then, by all of the measures, there has been a definite slowing down. [Don Daly, York University, 6:15:35]

Figure 1.1



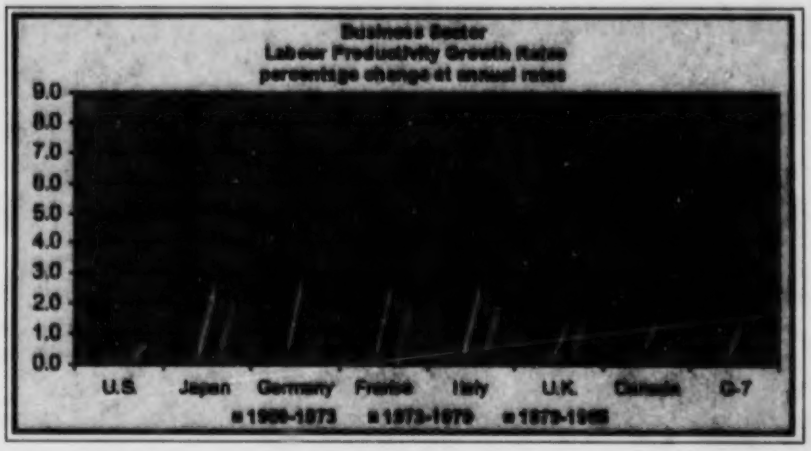
Source: Statistics Canada

While the Committee finds Canada's productivity performance since 1973 somewhat discouraging, little light can be shed on the nature and extent of the problem without first attempting the multi-country comparison below.

The G-7 Countries' Performance

Canada's comparator economies would, of course, be its partners in the G-7 countries; however, a detailed comparison of productivity cannot be attempted because the statistics collected in G-7 countries other than Canada are not extensive enough as one would like. Moreover, some of these countries use different statistical methodologies, making direct comparisons difficult; for example, there are significant differences in the way these countries calculate multifactor productivity, particularly with respect to the estimates of the capital stock. Thus, we would be best to restrict our analysis to labour productivity levels and growth rates, though even here a compromise is needed because, while the ideal indicator of labour productivity would include the number of hours worked, only statistics on the number of people employed are widely available across the G-7 countries.

Figure 1.2



Source: Organisation for Economic Co-operation and Development

Figure 1.2 captures the performances of G-7 countries in terms of growth rates for labour productivity between 1960 and 1996.[2] In this period, Canada outperformed only the United States and its performance was slightly below the G-7 country average.

> It's clear from this that Canada and the United States have followed relatively similar paths over long periods of time. We diverged from the American experience in the very late 1960s and early 1970s, prior to OPEC, but since that time we have followed them quite closely. [John Baldwin, Statistics Canada, 2:9:10]

A more complete picture of labour productivity emerges when we add productivity levels to the growth rate mix. Figure 1.3 illustrates labour productivity levels of the G-7 countries for the years 1989 and 1997. This diagram is based on an index of productivity levels with the United States set at 100. For purposes of direct comparison, all G-7 country productivity values are converted to American dollars according to 1990 purchasing power parity (PPP) formulas and are corrected for any inflationary bias in the period. The United States and Canada were by far the most productive countries of the world at the end of World War II, but the levels of European countries and Japan have subsequently converged with those of North America. There is nothing striking here; this was widely expected to happen. It was expected that the devastation of European and Japanese industries in the aftermath of the World War II would give an advantage to North America. A general catch up in productivity levels was inevitable as these countries continuously upgraded their production capabilities with the importation of best practice technologies from around the world, in particular North America.

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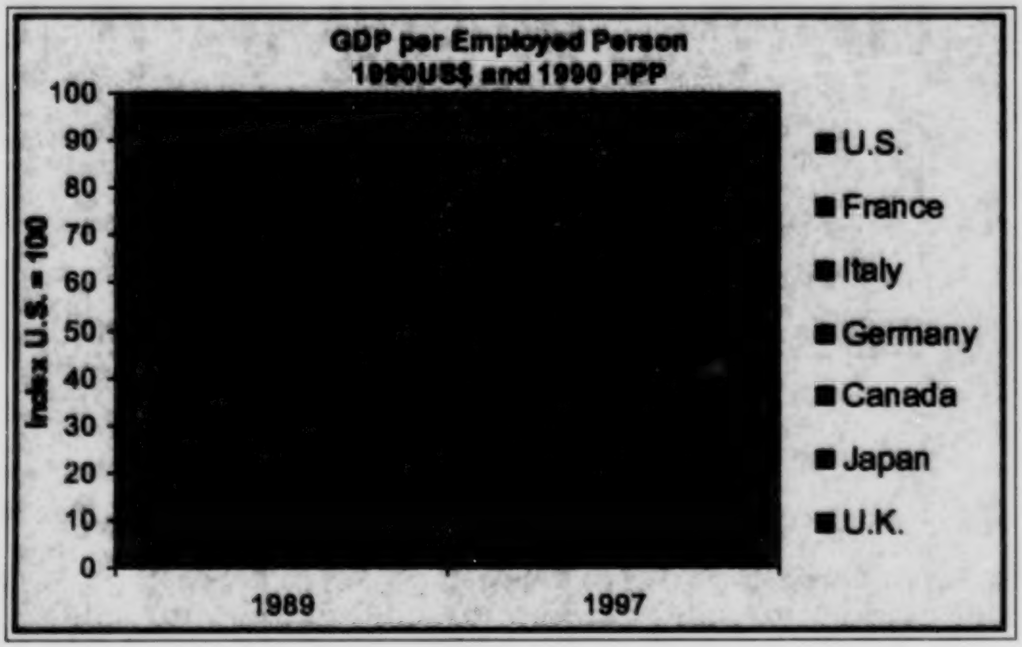
[2] This figure does not incorporate the most recent U.S. productivity data that reflect revisions in the U.S. national accounts dating back to 1959. These revisions reclassify computer software from a business expense to an investment. Consequently, U.S. productivity growth rates are significantly greater from the mid-1980s through to 1998; however, the unrevised data provide for a better comparison between the seven countries since similar revisions have not been made elsewhere.

Figure 1.3



Source: Organisation for Economic Co-operation and Development

However, a word of caution is advised. Americans work more hours per week than Canadians. "In 1998, roughly speaking, in Canadian manufacturing, workers worked 37.5 hours per week. In American manufacturing in the same year, they're working about 42 hours per week. This is a systematic difference" [Richard Harris, Simon Fraser University, 20:16:00]. The average North American worker also works more hours per week and more weeks per year than does the typical European. The implications for the above productivity data are:

> [W]e know that in microstudies, if you take a given number of employees and you work them longer hours — within limits — you achieve certain productivity gains. That is, you get more output per worker by adding hours per worker. ... This is of course a very big part of the debate about the American versus the European style of manufacturing system. [Richard Harris, 20:16:00]

Since Figure 1.3 measures productivity on a per person basis, the gap between Canada and the United States is somewhat overstated when compared to productivity measured on a per hour worked basis.

On the other hand, Canada's performance relative to that of the European members of the G-7 countries is slightly overstated. However, the Committee wants to reinforce its view that productivity is today more about working smarter and more efficiently than about the number of hours worked and its intensity.

The data are, nevertheless, clear and unequivocal: the United States remains the most productive country in the world, but Canada no longer holds second place.

> Canada is the only country in the G-7 that has not closed its gap relative to the U.S. in terms of productivity. In 1976, Canada was second in terms of productivity level among the G-7 countries. In 1997, Canada was fifth. All other countries have converged to the U.S., are much closer to the U.S., and have overtaken Canada. [Serge Nadeau, 2:9:35]

Italy and France are respectively the second and third most productive countries in the world. Germany, despite the reunification of the West part of the country with the moribund East, is the fourth most productive economy in the world.

The Committee, therefore, recommends:

1. **That the Government of Canada broaden its innovation agenda as setout in *Budget 2000* with the objective of raising the business sector's productivity growth rates above the average posted by the G-7 countries on a consistent year-to-year basis.**

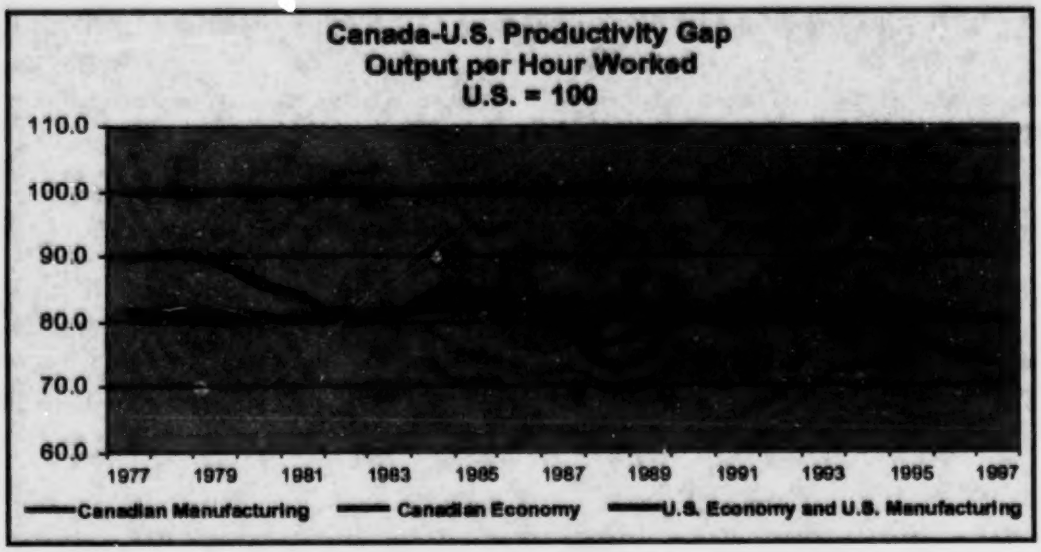
The Canada-United States Productivity Gap

So far the Committee's review of Canada's productivity performance over the past three decades and across G-7 countries revealed nothing new or unexpected, but what remains to be looked into is the disaggregated data. The Committee must explore the possibility that the aggregate productivity data somehow mask the performances of specific sectors where public concern is warranted. Here, a Canada-United States comparison will suffice since these societies, including their business sectors, are the most comparable.

Figure 1.4 presents the Canada-United States productivity gap over the past 20 years. Canadian labour productivity relative to that of the United States is in 1997 much the same as it was in 1977. Similar growth rates for productivity in the two countries in the last two decades mean that the average Canadian worker produces a little more than 80% of what the average American worker produces. However, Figure 1.4 illustrates that the productivity performance of the Canadian manufacturing sector, which accounts for approximately 20% of GDP, is poor relative to that of the United States. Whereas the average Canadian worker employed in the manufacturing sector produced 90% of that of the average American manufacturing sector worker in 1977, today he or she produces only 73%. In the words of one witness appearing before the Committee:

> [I]n the 1990s we've had about 2.2% average annual output per person-hour increases in manufacturing productivity, and that compares to about 3% in the United States. This differential of around 1% has meant our productivity level in manufacturing has fallen from about 78% of that in the United States in 1989 to about 73% in 1998. This compares with an overall productivity gap of about 20% with the United States. [Andrew Sharpe, 8:9:20]

Figure 1.4

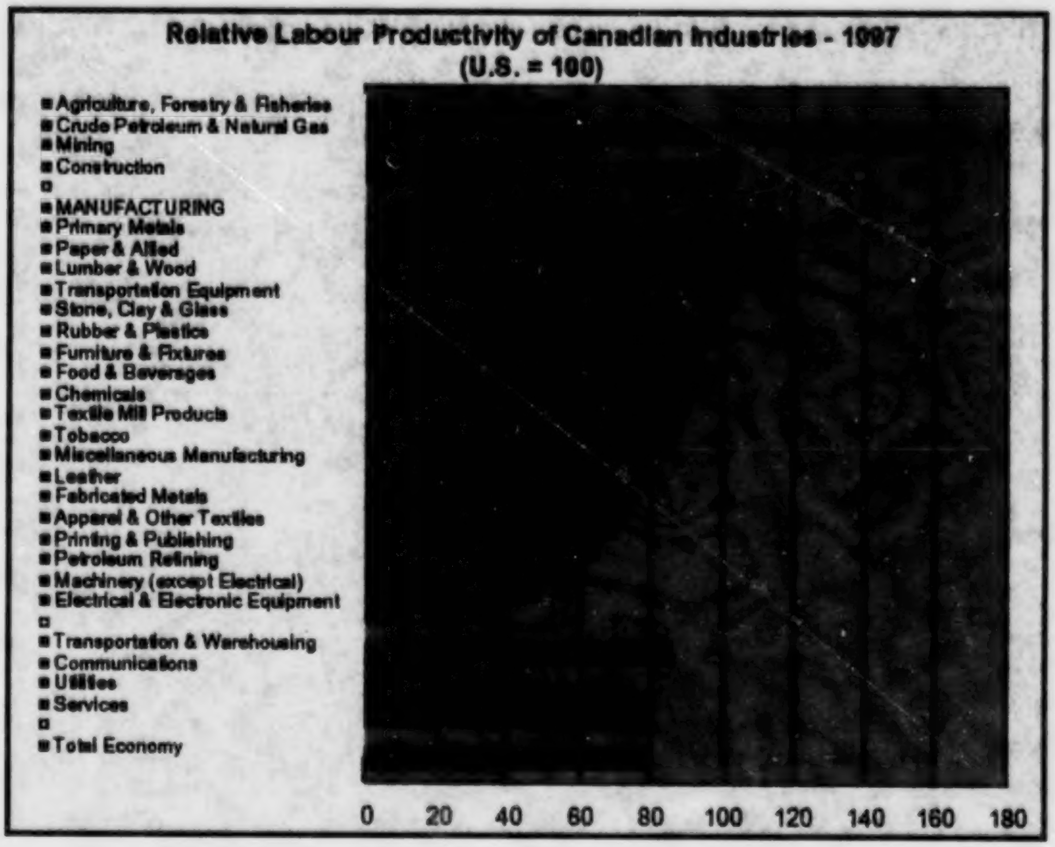


Source: Statistics Canada and the U.S. Bureau of Labor Statistics

One witness investigated further by comparing total or multifactor productivity to labour productivity between the two countries and came up with an interesting observation:

> [T]otal factor productivity … gives a remarkably different picture of the productivity situation of the Canadian manufacturing industry than the labour productivity numbers would suggest. … [W]hat is remarkable is that even though there appears to be much less difference between total technical efficiency or total productivity, there is still a very significant difference in the data between labour productivity. That suggests that rather than technical efficiency differences or the fact that somehow Canada is using inferior technology or inferiorly educated or trained workers, it has something to do with the availability of the other inputs. … The … difference, which is extremely striking, is capital per worker. Now, average labour productivity can go up either because total factor productivity has risen — which appears not to be the big contributor to that — or the fact that capital per worker is different. One of the remarkable differences between the two countries has been the fact that capital per worker has consistently grown in the U.S. manufacturing sector, including through the '90s. While it had grown significantly through the late '80s, from 1990 through 1996, capital per worker declined significantly both in absolute and in growth rates. [Richard Harris, 20:16:05]

Figure 1.5



Source: Industry Canada

While the Committee understands that there are significant measurement problems associated with productivity indicators on a sectoral basis and that other methodologies suggest that the gap is either smaller or larger than as above, it finds the performance of Canada's manufacturing sector troubling and deserving of further study. For this reason, the Committee borrowed from the work of Industry Canada, as shown in Figure 1.5. This chart displays the relative labour productivity levels of selected industries in Canada and the United States.

> Canada is more productive than the U.S. in very few sectors. … [T]hese sectors are resource-based sectors: crude petroleum, primary metal, paper and allied, and lumber and wood. There is transportation, where we're doing quite well, and also stone, clay, and glass. In transportation equipment — that's the auto sector — we are more productive than the U.S. But the point here … is … the sectors in which we are doing better than the U.S. are natural resource-based sectors, sectors in which we have a large endowment. [I]f we look at the two fastest-growing sectors in North America — that is, machinery, electrical, and electronic equipment — these are what we call knowledge-based sectors, very fast-growing sectors,

> more dynamic sectors, and Canada's productivity is about half that of the U.S. Of course, that can vary from company to company. Nortel is very competitive. These are just averages. But the fact is that in these sectors overall, we are 50% less productive than the U.S. [Serge Nadeau, 2:9:40]

The productivity gap between Canada and the United States appears to manifest itself in small and medium-sized enterprises (SMEs) as well. However, what to make of this fact is unclear.

> A large firm is not just a small firm multiplied up across all factors of production. It is therefore extremely difficult to measure the overall efficiency of small versus large, which is why you want multifactor productivity measures. We can measure labour or output per worker, and we know that small firms are less productive than large firms on that measure alone because they produce less per person. But there's a good reason for that: they're less capital intensive. They do not employ the same amount of capital per person. Small firms have a different production process ..., but I'm always very cautious in then suggesting that it tells us something about efficiency ... Labour productivity can be different because of differences in efficiency, but it can also be different because you just use a very different capital-labour ratio ... [John Baldwin, 2:10:20]

Nevertheless, relative evaluations across countries and time are somewhat revealing:

> [T]he relative levels in value added per employee between large plants and small plants ... has [shown] a significant divergence from ... the early 1970s, through to the mid-1990s ... Relative to the United States, there has been a slight gain in the large plants vis-à-vis the U.S. national average, but for the small plants there has been a dramatic drop away. This pattern of lower productivity levels in the small establishments shows up also in lower wages, lower profits on average, etc. So there is a problem here in small business in terms of its productivity levels, particularly when the increases in employment have been so dramatic. [Don Daly, 6:15:35]

The Committee finds this situation particularly disturbing because SMEs are largely responsible for the increase in business start-ups and employment in Canada over the past three decades. Indeed, when you combine this trend with the observation that a lower capital-to-labour ratio may be the cause of poor productivity in Canadian manufacturing relative to that of the United States, knowing full well that SMEs have lower capital-to-labour ratios relative to large companies, the composition or structure of the Canadian manufacturing sector immediately looks suspect. It could very well be that it is the small size of Canadian manufacturing companies which explains a good deal of the Canada-United States productivity gap in manufacturing.

Clearly, if Canadians are to prosper in the third millennium, something must be done to remedy the poor productivity performance of SMEs. Indeed, the Government of Canada recognized this challenge in *Budget 2000*, offering SMEs more and better access to financing through greater retained earnings that will ensue from the drop in the corporate tax rate from 28% to 21% for SMEs with business incomes between $200,000 and $300,000 and through external capital sources with $80 and $54 million injections into the Business Developmentzaza Bank of Canada and the Community Futures Program, respectively. This additional financing will enable them to invest in productivity-enhancing machinery and equipment to secure and grow their businesses. Moreover, the Committee further recommends:

> **2. That the policy initiatives flowing from the Government of Canada's innovation agenda be designed to provide an advantage for the manufacturing and small and medium-sized business sectors.**

CHAPTER 2:

PRODUCTIVITY IN INDUSTRIALIZED ECONOMIES: WHAT HAPPENED POST-1973?

Three aspects of Canada's poor productivity performance need explanation. The first (discussed in this chapter) involves the sets of factors that have contributed to the decline of productivity growth rates across the industrialized world since 1973. Canada likely shares these causal factors with other countries of the industrialized world. The second (discussed in Chapter 3) concerns the factors that led the Canadian manufacturing sector to lose pace with that of the United States since the late-1970s, thereby enlarging the pre-existing productivity gap between the two countries. Finally, the third (discussed in Chapter 4) deals with SMEs, particularly those that are Canadian owned, and their contribution to the productivity gap in manufacturing and its widening. The causal factors of these last two aspects of productivity are likely to be unique to Canada. Fortunately, witnesses appearing before the Committee were not afraid to speculate on both these trends.

To account for the slowdown in productivity across the industrialized economies, Canada's productivity experts identified lower investment rates in physical capital, particularly in machinery and equipment (M&E), the structural shift in the economy away from manufacturing towards services, and the so far apparently unrealized productivity gains from investments made in computer or information and communications technologies (ICT). The Committee will examine each of these explanations in turn.

Capital Accumulation

Almost every witness identified a lower rate in net fixed capital formation across the industrialized world as the primary source of poor growth in productivity since 1973. Simply put, the slow pace of capital investment has led to a lower growth rate for labour productivity. In some sense, this seems obvious; since people are more productive when working with more and better tools, lower growth in the capital-to-labour ratio as a result of lower capital investment translates into lower growth in productivity. However, there may be more here than meets the eye.

It has been estimated that about 80% of all technical progress comes from, or is embodied in, new M&E.[3] So significant and protracted lower investment in physical capital, regardless of any change in the capital-to-labour ratio, may result in lower productivity growth through a stunted rate of technical progress in the economy. Another way of looking at this is to consider the average age of the capital stock. It is generally understood that new capital, particularly that classified as M&E, is more likely to embody newer and best practice technologies than older capital. Thus, an aging capital stock

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[3] DeLong, J.B. and L.H. Summers, "Equipment Investment and Economic Growth," *Quarterly Journal of Economics*, 106, 1991, p. 445-502.

(which may result from a lower capital investment rate) can reduce productivity growth simply because technical progress (at least 80% of it) is coincidentally stunted.[4] Indeed, the mere slowing of the decline in the average age of M&E (that is, not simply an aging M&E) can slow both the rate of technical progress and productivity growth in the economy. Researchers have confirmed the existence of this development, often referred to as the *vintage effect*, and made preliminary estimates of its deleterious economic impact. Finally, since new physical capital also implies complementary worker training, a decline in capital investment may also entail a reduction in human capital investment — another positive correlate of productivity.

Thus, both the direct and indirect effects of a lower rate of fixed capital formation can lessen the growth of productivity. The Organisation for Economic Co-operation and Development (OECD) is the best source of information on net investment. It reports that net investment — net of depreciation charges — for its member countries hovered in the vicinity of 12% in the 1970s, 10% in the 1980s, and has trended down to about 5% in the 1990s. The Committee would also refer to an Industry Canada study on the age of Canada's capital stock and the resultant slowdown in productivity growth in Canada:

> The patterns of changes in the age of machinery and equipment generally mirrors that for the capital stock. During the 1963-73 period, the age of M&E declined in almost all industries. Only three service industries — transport and storage; communications; and community, social and personal services — showed a slight increase in the age of M&E. For the period 1973-92, capital accumulation in M&E decelerated in almost all industries except service industries, causing the reduction in the age of M&E to either reverse or slowdown. For most service industries, the age of M&E actually declined at a faster rate in 1973-92 than in 1963-73.[5]
>
> First, we find significant and robust evidence of the vintage effect (embodied technical progress) across Canadian industries, explaining (on average) about 14 per cent of the post-1973 slowdown in TFP growth and 7 per cent of the slowdown in labour productivity growth. ... The rate of technical progress embodied in M&E declined sharply from 8.5 per cent per year over the 1963-73 period to 3.3% per year over the 1973-92 period.[6]

To some extent, *Budget 2000* recognizes and corrects this problem by reducing the corporate tax rate from 28% to 21% and by lowering the inclusion rate of capital gains subject to tax from three-quarters to two-thirds. The Committee, however, believes that more can still be done to sustain this boost in investment and, therefore, recommends:

3. That the Government of Canada design its industrial policies to stimulate business sector investment in physical capital, in particular machinery and equipment, with the aim of raising Canada's investment rate above that of the G-7 country average.

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[4] Furthermore, an aging capital stock implies higher repair and maintenance charges per unit of output and a diversion of resources from other productive activities to repair and maintenance is certainly not conducive to the growth of productivity.

[5] Gera, S., W. Gu and F.C. Lee, Capital-Embodied Technical Change and the Productivity Growth Slowdown in Canada, Industry Canada, Working Paper No. 21, 1998, p. 11-12.

[6] Ibid., p. 29.

Although small by comparison, the public sector's capital stock must be incorporated into the analysis. Public infrastructure, such as airports, marine ports, roads, public transit, sewers, education facilities and hospitals also contribute to a nation's productivity through their impact on the operational efficiency of the business sector. As it was put to the Committee: "Competitiveness has to do with improving the efficiency and effectiveness of the marketplace. ... With governments, ... there is the issue of the provision of physical infrastructure to move goods to markets" [Michael McCracken, Informetrica Ltd., 8:9:40]. Here, real gross government fixed investment in Canada has trended down from its peak of about 4% of GDP in the 1960s to 2.2% in 1997. On the positive side, some of these public facilities have recently been privatized, promising a more commercial orientation which is believed to be conducive to greater productivity. *Budget 2000* further proposes a multi-year plan to improve provincial highways and municipal infrastructure by investing $1.6 billion over the next 3 years.

While the Committee praises the government for its proposal to provide additional spending for public infrastructure, it feels much more is required to complete the task at hand. Estimates of the costs to upgrade the major federal and provincial road infrastructure vary between $10 billion and $20 billion. The Committee believes that this investment will pay dividends to Canada, mostly in the form of strong growth in productivity, and should be completed within a reasonable period of time. The Committee therefore, recommends:

4. **That the Government of Canada in cooperation with the provinces and municipalities increase investment in public infrastructure in transportation networks.**

Structural Shift from Manufacturing to Services

Some analysts single out the growing services sector across the industrialized world as a principal reason for the poor productivity growth performance since 1973, though some witnesses appearing before the Committee were hesitant to support this view. Seemingly backing this claim is a recent OECD study that compared labour productivity growth rates in various sectors of the economy and concluded that the best performers were high and medium-high technology industries, manufacturing, and the services sector, in that order.[7] The Committee will cite an Industry Canada Working Paper that provides the labour productivity values for selective industries in Canada, as is shown in Table 2.1. Clearly, the measures of labour productivity in the services sector are, on average, lower than those of other sectors, by a significant margin.

The thrust of these arguments is that the compositional shift in the economy from the high productivity manufacturing sector to the low productivity services sector — the latter, which made up about half of GDP at the beginning of the post-World War II period, now accounts for about two-thirds of GDP and three-quarters of employment in industrialized economies — has had an adverse impact on overall productivity growth rates. Moreover, the labour-intensive nature of many services cannot take the same advantage of computer-based capital improvements as other sectors of the economy. There are only so many haircuts a barber can give; only so many clients a tailor can serve; and only so many articles a columnist can write in an average working day. The productivity of these service workers is thus doomed to stagnation.

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[7] OECD, *Technology, Productivity and Job Creation — Best Policy Practices*, 1998, p. 46.

Table 2.1

Labour Productivity for Selective Canadian Industries — 1992

Service Sector	Labour Productivity (1986$ per hour)	Non-Service Sector	Labour Productivity (1986$ per hour)
Electricity, Gas & Water	111	Agriculture, Forestry & Fishing	29
Construction	57	Mining & Quarrying	134
Wholesale & Retail Trade	24	Food, Beverages & Tobacco	105
Restaurants & Hotels	22	Textiles, Apparel & Leather	41
Transport & Storage	50	Wood Products & Furniture	58
Communications	89	Paper, Paper Products & Printing	72
Community, Social & Personal	30	Basic Metal	129
		Electrical Goods	81

Source: S. Gera, W. Gu and F.C. Lee, op.cit., Table 1, p. 10.

At face value these facts tend to implicate the services sector, but further investigation casts doubt. In the first place, the traditional productivity measures are seriously inadequate for applying to the services sector. For example, in the retail sector, beyond the inputs of firms, considerable inputs are provided by consumers in the form of shopping activity. Unfortunately, there are no satisfactory statistical measures of these non-commercial inputs and how they change over time. Interpretations of the retail services sector's efficiency based on productivity measures that include only the commercial inputs are suspect because there can be considerable substitution between them and non-commercial inputs. Secondly, "window shoppers" place some value on the services they receive, but they leave no statistical trace and are, therefore, not included in the productivity measures. Finally, the retail sector is notorious for providing very heterogeneous outputs and inputs that pose considerable problems for aggregation into a single measure.

Financial services, like most consumer goods and services, are also provided by way of an intermediary sector: they bring buyers and sellers of funds together through the operation of distribution and marketing outlets. With respect to the banking subsector, the past three decades have seen considerable telecommunications-based change at banks that has resulted, amongst other things, in an expansion of the hours of service and points of service delivery from so-called "bankers hours" at one branch to 24 hours a day almost anywhere in the world. The subsequent reduction in customer waiting time has provided considerable value and convenience, as has the ability to pay bills in the comfort of one's home over the Internet or telephone. The advent of ATMs and debit-card services has also immeasurably reduced the shopping time and driving expenses of bank customers in these leisure-constrained times. Unfortunately, the productivity measures of the banking subsector, an industry that has significantly reduced customer-related inputs by incurring very significant capital costs in their stead, do not properly reflect these improvements. However, limited supporting evidence was provided to the Committee:

> CIBC like all Canadian banks can be described as IT intensive. Its IT investment increased by 86% between 1988 and 1995, from $129 million a year to $239 million. One focus for this investment was automatic banking machines. The number of installations over the 10 years from 1987 to 1996 grew by 310%. Information technology changed the dynamic of work in

> the bank branch. Instead of queuing up sometime between 8.00 a.m. and 5.00 p.m. to hand a bank teller the information necessary to complete a transaction, ABMs gave the customer the power to input that information directly at any time of day or night. The banks did their own productivity analysis. They established that the cost of a mediated transaction over the counter was $3. They invested heavily in the technology to develop alternative channels of delivery. Telephone based banking … dropped the transaction cost to $1.50. Banking via personal computer brought the cost to 50¢. And Internet banking heralded an era where transactions could cost as little as 15¢ each. [Gaylen Duncan, Information Technologies Association of Canada, 26:16:20].

For all these reasons, this Committee would tend to side with one eminent witness who stated that "our productivity, that is output per worker, is lower than it should be primarily because of a poor performance in manufacturing, as opposed to services" [Dale Orr, WEFA Canada Inc., 10:9:20]. The Committee, therefore, recommends:

5. **That the Government of Canada improve data collection on productivity and its measurement in the services sector and communicate to Canadians the importance of productivity to quality of life.**

The Information and Communications Technologies-Productivity Paradox

From the perspective of the business sector, the past decade has been particularly noteworthy for the investments made in ICT. Indeed, virtually all industries and sectors of the Canadian economy made considerable investments in ICT in the 1990s in the hopes of modernizing their operations and offices; the general understanding was that this would raise productivity levels. Firms across the industrialized economies of the world followed the same investment pattern. The Centre for the Study of Living Standards (CSLS), however, reports only on the Canadian circumstance:

> [B]etween 1992 and 1995, investment in office computers in the Canadian services sector rose by 64.2 per cent in real terms, but total factor productivity advanced a meager 1.2 per cent. Even more perplexing …, the service industries with the highest proportion of computer investment in total investment tended to experience the worst total factor productivity growth![8]

As this poor productivity performance relative to ICT investment is largely mirrored elsewhere in the Canadian economy (see Table 2.2) and evidence appears at best mixed when using data from across the industrialized world, one is left to question the promise of what has been described by the pundits as the ICT dynamo.[9]

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[8] The Centre for the Study of Living Standards, *Productivity: Key to Economic Success*, March 1998, p. 32.

[9] For a review of international studies of ICT and productivity, see Gera, S., W. Gu, and F.C. Lee, *Information Technology and Labour Productivity Growth: An Empirical Analysis for Canada and the United States*, Industry Canada, Working Paper No. 20, March 1998.

Table 2.2

Computer Investment and Total Factor Productivity Growth in the Service Industries in Canada

[illegible]	[illegible]	[illegible]	[illegible]
Transportation and Storage	3.4	86.8	6.8
Communications and Other Utilities	7.8	108.3	9.7
Wholesale	14.7	59.1	-0.6
Retail	16.5	351.4	-0.2
Finance, Insurance and Real Estate	13.4	85.8	-0.8
Business Services	55.8	3.2	-15.6
Government Services	6.6	45.2	0.1
Educational Services	7.3	67.0	-2.2
Health and Social Services	7.5	97.2	-4.6
Hotels and Restaurants	5.4	3.4	4.2
Total Services Sector	9.8	64.2	1.2

Source: Centre for the Study of Living Standards, *Productivity: Key to Economic Success*, Table 8, p. 35.

This unexpected development, labelled by some economic researchers as the *productivity paradox*, has given rise to three potential explanations:

1. Though computer investments are providing the expected productivity improvements, these are not showing up in the productivity statistics because these measures are unable to capture their impact accurately.

2. The returns on computer investments are overblown as they also require expensive and often disrupting adaptations in the workplace.

3. Major technological innovations in the workplace, such as the computer and peripherals, require considerable time before they are diffused throughout the economy and before they can be operated effectively and efficiently.

This Committee is obviously in no position to resolve this debate, but it suspects that all three hypotheses may possess some truth. Clearly, the first suggests that improvements are required in our productivity measures and indicators, particularly those for the services sector, which has been an intensive user of ICT. This finding only confirms the Committee's previous recommendation. For the second hypothesis, which suggests that corporate leaders across the world have been unjustifiably exuberant over ICT and implies the need for tougher investment criteria, the Committee has no solution to offer. Finally, the implication of the third hypothesis, that the productivity benefits of new technologies may be delayed, suggests an analogy with electricity, which took more than 40 years, until the 1920s, before demonstrating any appreciable productivity improvements.[10] These implications, which are far-reaching and demand workplace and other institutional adjustments, will be explored by the Committee in more detail.

The lag in productivity improvements from investments in ICT may be due to the difficulties in effective implementation of the new technologies, which are often institutional in nature. Indeed, if these barriers did not go beyond the simple issues of affordability and worker training, they would have largely been overcome by the power of computers, as it increased by leaps and bounds, and the rapidly decreasing prices in the past two decades. Institutional changes, however, cannot take place overnight and sometimes require younger generations to fully execute. Human nature is just not as flexible, adaptable or even amenable to fundamental change as is often required by the new technologies and its timeframes for adjustment are clearly more protracted. It has been suggested that such institutional changes include the possible flattening of workplace hierarchies, the formation of multidisciplinary work teams within this hierarchy, the delegation of more decision making to the working level in combination with more two-way communication and control, flexible work conditions (hours and place of work), incentive payment schemes based on productivity or profitability performances, and a wholesale revamping of the industrial relations rule-making labyrinth and its supporting institutions.

History provides few precedents of such fundamental change to act as the basis for comparison or prediction. In a general way, we can conclude that the Industrial Revolution transformed small cottage businesses into large industrial complexes when it brought production out of the home and into the factory setting. The increased mechanization of the production processes required the loss of personal choice in determining the intensity, consistency and duration of one's work effort and workers' assignment to highly specialized activities in order to ensure continuous and coordinated throughput.[11] Today's economies of scale and productivity gains could not have been realized otherwise.[12] While people were well rewarded for this loss in sovereigny and their assignment to often mind-numbing activities, a professional class of negotiators emerged to ensure that the adopted factory disciplines did not stray too far from productivity considerations. Generic factory work rules became institutionalized and have come to be practised the world over, but this took a century or more.

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[10] The better distribution and conveyance of power by electrical means permitted factories to: (1) locate at greater distances from waterways; (2) rather than being built in three-story cube-like designs, become longer and more rectangular in shape to make way for Fordist-like assembly production lines; and (3) shift from downtown city cores to outlying industrial parks to obtain greater real estate for these larger factories. In this case, manufacturers were not willing to immediately abandon their existing plant and equipment. Only once their facilities had become significantly depreciated and outdated did it become financially feasible to take full advantage of the productivity benefits of electricity by implementing these restructurings.

[11] Since an individual's productivity had become highly dependent on that of colleagues in such a setting, one could argue that the surrender of such decision making to a shopfloor manager was to ensure that these colleagues would not shirk in their assigned tasks.

In contrast, contemporary business practices are allowing employees to work at home and to tele-commute to work, while, at the same time, enabling managers to spin off numerous business opportunities to smaller satellite ventures so that the firm can better focus on core activities. Hence, the Information Revolution appears to be de-scaling the activity levels of firms and putting work back into the home. The emergence of lean or flexible manufacturing techniques further orchestrated the dismantling of rigid work rules in favour of worker activism for taking advantage of the new-found human capital dimension of their job assignment.[13] Firms are also providing financial incentives to ensure workers' continuous motivation and productivity, as well as attempting to tie down this "footloose" and intangible knowledge capital. Though these workplace changes will undoubtedly accompany ICT, they are likely to take considerable time before being fully implemented. It has since been suggested that we are on the cusp of a productivity boom in which the dawn of the Information Revolution is likely to be as powerful and relentless as the early stages of the Industrial Revolution. The Committee can only hope that this is the case.

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[12] The key principles behind mass production techniques are product and component part standardization, special-purpose equipment and the elimination of skilled labour on the assembly line.

[13] The key principles behind lean production techniques are: the "just-in-time" availability of components for assembly in order to economize on inventories; autonomous control of defects, whereby assembly line workers can stop the process when defects are found and until its source is identified and corrected in order to economize on "re-work" stations and costly manufacturer recalls; and the replacement of unskilled and specialized assembly line workers by multidisciplinary teams that would, through "quality circles," further contribute to improvements in the production process.

CHAPTER 3:

PRODUCTIVITY IN CANADIAN MANUFACTURING: WHAT WENT WRONG? WHAT WENT RIGHT?

The second area of Canada's poor productivity performance in the past 20 years that should be examined is related the manufacturing sector. We need to know why the Canadian manufacturing sector has lost pace with the United States to such an extent that there is now a gap of more than 25% between the value created by the average manufacturing worker in the two countries. Canada's productivity experts seem to agree that, rather than the entire manufacturing sector, two subsectors are primarily to blame: electrical and electronic equipment and industrial and commercial machinery. These subsectors form an integral part of the high technology sector, which appear to be important catalysts to the growth of national productivity in both countries. In contrast to medium and low technology industries, those in high technology are characterized more by product innovation than process innovation. Consequently, the Canada-United States productivity gap in manufacturing may be traced back to a product innovation gap between the two countries.

The source of this gap is a deficiency of R&D, a Canadian failure to access American product and production process knowledge in a timely fashion, and slowness to adopt new technology, particularly in the high technology sector. Probably a more important source of poor productivity growth, however, has been a sluggish rate of capital investment by the Canadian manufacturing sector, particularly when compared to our major trading partner, the United States. A more debatable contributor to the innovation gap is the relative loss in foreign direct investment (FDI), an important factor on which Canada has traditionally relied for accessing and diffusing productivity-enhancing technologies and products. On the positive side, the Canada-United States Free Trade Agreement (FTA) has been identified as having enhanced the Canadian manufacturing sector's productivity growth. The Committee will now look into these issues.

The Canada-United States Productivity Gap in Manufacturing

Striking in Canada's productivity performance is the fact that, overall, the business sector fared about the same, if not slightly better, than that of the United States for more than three decades. One significant sector, manufacturing, fared miserably, however. The value of manufacturing output represents approximately 20% of both economies and the similarity of these economies and their forces of change suggest, other things being equal, that their manufacturing performances should not have been so different.[14]

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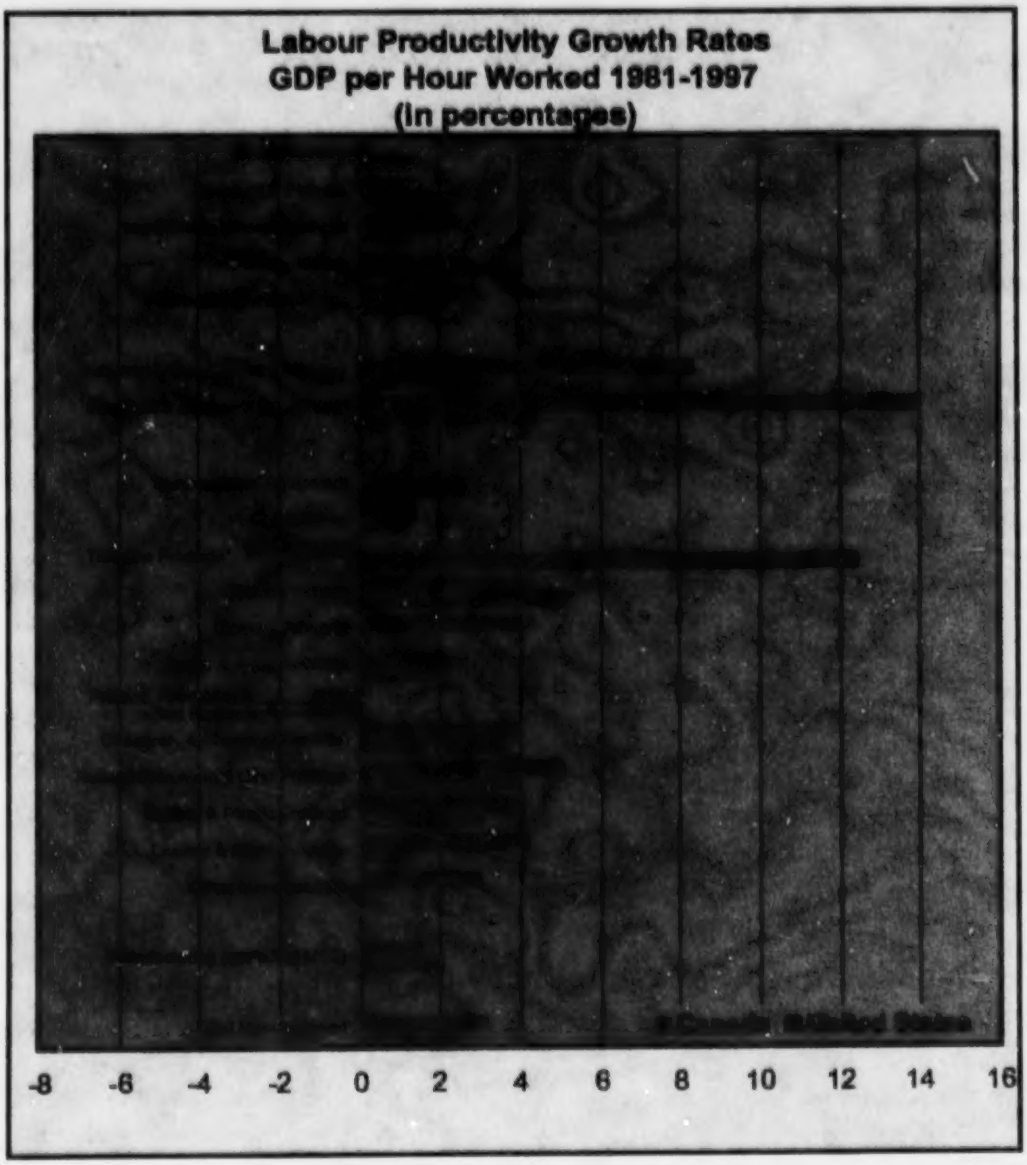
[14] The fourth section of this chapter suggests that, in fact, other things may not have been equal. Both industries began diverging in their performances beginning in the late-1970s, probably because of the immutable forces of globalization and the ensuing specialization, but the FTA may have further contributed to the specialization in both economies.

Figure 3.1



* Canadian data on tobacco products and United States data on electrical and electronic equipment for 1989-1997 period only.

Source: Centre for the Study of Living Standards, *New Estimates of Manufacturing Productivity Growth for Canada and the United States*, Table 5, p. 9.

Figure 3.1 demonstrates both the similarities and dissimilarities between the labour productivity of various manufacturing industries in Canada and the United States over the 1981-97 period. Overall, the United States (3.2%) clearly outperformed Canada (2.2%) in this period; a difference of about one percentage point over roughly two decades can leave a significant mark on both economies.

What immediately stands out from Figure 3.1 is the disparity between the productivity of the electrical and electronic equipment and industrial and commercial machinery subsectors of the two countries, with the United States decidedly superior.[15] Over a period of roughly two decades, this difference can have a significant impact on the structures of both economies. One witness was more emphatic about the significance of this development:

> Let's look again at the two fastest-growing industries in North America in the manufacturing sector: electronics and other electrical equipment and machinery. U.S. productivity in these two fastest-growing sectors has been about three to four times faster than in Canada. But even more important is that the U.S., because it is productive in these areas, has been able to double its share of these two sectors in their output while Canada has barely increased its share over the period. So these are the two fastest-growing sectors — productivity sectors — in the U.S., and they happen to be the two fastest-growing sectors in North America. Now let's look at the two fastest productivity growth sectors in Canada. These are tobacco and refined petroleum and coal. These are not exactly the fastest growing. Natural resources are great and are important, and it's great that they've improved their productivity, but let's face it, these are not exactly the sectors of the future. [Serge Nadeau, 2:9:45]

Only one telling conclusion can be drawn from these results. If we accept that the high technology sector is fuelling much of the increase in economic activity and productivity, and is responsible for propelling the economy towards a knowledge-based society, then the United States is far more along this road than Canada. Viewed through these narrow lenses, the American manufacturing sector appears to be far better prepared for the future and for what prosperity and challenges it may hold than the Canadian manufacturing sector.

The Canada-United States Innovation Gap

The preceding section suggests that the growing productivity gap between manufacturing sectors of Canada and the United States, though significant and protracted, is not pervasive, being primarily limited to two broad subsectors — though these are probably important areas for the future. Most manufacturing industries in the two countries demonstrate little difference in performance, suggesting that targeted policy responses, rather than broad-brushed solutions, are required.

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[15] The U.S. statistical agency, in calculating the productivity of the electronics industry, adjusted the real prices of these goods (i.e., computer products) for their quality differences (i.e., computational power and other characteristics), whereas the Canadian data do not reflect this adjustment. This means that the price index for these products is rising faster in Canada than in the United States (actually, it has Canadian prices rising by 9% and American prices falling by 51% between 1992 and 1995), thereby generating a greater growth rate in productivity in the United States than in Canada. The Canada-U.S. differential productivity in this subsector is, therefore, largely a statistical artifact, but not completely. Caution must be used when citing this subsector as a cause for the Canada-U.S. productivity gap; indeed, one should be wary of making too much of this disparity.

Machinery and equipment manufacturing industries, largely belonging to high technology, are distinguished from most other manufacturing industries in that they are characterized more by product innovation than process innovation. Thus, the Canadian manufacturing sector's poor relative productivity performance suggests that solutions must be sought in the product innovation policy area. For confirmation of this, we must look to R&D expenditures, indicators of access to foreign sources of knowledge — for Canada, particularly the United States — and technology adoption rates.[16]

The OECD reports Canada's gross expenditure on R&D as a percentage of GDP to be 1.6% in 1997, considerably below the OECD average of 2.2%. Significant R&D spenders are Japan, 2.9%, South Korea, 2.9%, Finland, 2.8%, and the United States, 2.7%.[17] The world leaders in R&D are thus spending as much as 80% more per dollar of GDP than is Canada. Amongst our comparator countries, "Canada has the second lowest R&D expenditures as a percentage of GDP among the G-7" [Serge Nadeau 2:9:50]. This situation, as explained to the Committee, may be partly due to factors beyond our control: "R&D is relatively lower in small businesses than it is in large businesses. We have more small businesses relative to the Americans. So that's a part of it" [Dale Orr, 10:10:20]. The other structural feature of the Canadian economy that is partly beyond our control is foreign ownership.

> There are two impacts of foreign ownership. One is that companies are prone to do R&D, like other central-office functions, at home, as opposed to where they move around the world. This is true of the American companies in Canada … The other impact is that foreign ownership is disproportionately high in technologically intensive industries, partly because the Americans are the technological leaders. [Dale Orr, 10:10:20]

If we look for clues about innovation in the patenting activity of different countries, the results are mixed and inconclusive. On the one hand, the data portray Canadian businesses as laggards:

> If we look at patenting activity, what we see is that, in total, … the U.S. are about three times higher than in Canada overall, but it's also across many sectors. It's even worse … in computers and communications — very dynamic sectors — where the ratio is about four to one, and in electrical and electronics. Overall, we patent three times less … than the U.S., but it's four times in the most dynamic sectors. … [M]aybe Canada is missing the technology boat. [Serge Nadeau, 2:9:50]

On the other hand, Canadian businesses may be seen as neither laggards, nor leaders; we might actually be somewhere in the middle of the pack:

> You can take a look at patents that are being issued in U.S. markets and divide it, not by the Canadian population but by the number of R&D workers in Canada, so you get a patents number per R&D worker in Canada. And that falls right in the middle of the rest of the world. … Our scientists thus appear to be as equally productive as those in other countries, but we have fewer scientists, fewer R&D workers … [John Baldwin, 2:11:05]

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[16] The evidence provided to the Committee on this score only explains the reason for an innovation gap, not its expansion. We were then left to infer that the gap increased because these deficiencies have gotten worse.

[17] OECD, *Main Science and Technology Indicators*, 1, 1999, Table 5.

One does not, of course, have to undertake R&D to enjoy its benefits; one can piggyback on the R&D of others. Innovations can be imported from abroad by purchase, entering into a licensing agreement, or being a recipient of FDI. The Committee was reminded more than a couple times that Canada represents less than 1% of the world's population and is probably responsible for only about 2% of the world's original ideas that can be used by industry.

> I think we must never lose sight of the fact that even if Canada is a very successful creator of new knowledge, 97%, 98% or 99% of the new knowledge that's relevant to Canada is, and will be indefinitely into the future, created outside Canada. You take that as a starting point. Therefore, if Canadian productivity growth is relatively slow, the first place to look is the networking of knowledge flow into Canada and the adaptation to Canadian circumstances. [David Slater, Economist, 10:9:30]

Consequently, Canadian R&D vastly understates the availability of new technology to Canadian industry and its implications for economic welfare are even more important when one factors in the cost of this availability (foreign technologies are frequently much less costly).[18]

While it is hard to evaluate Canadian access to foreign knowledge, a rather novel method was uncovered by Manuel Trajtenberg of the Canadian Institute for Advanced Research.

> When Canadian firms take out a patent in the United States, they are legally required to cite all related older US patents. ... [B]etween 1977 and 1993 Canadian patents taken out in the US cited US patents 15,000 times. This is hard evidence of Canadian piggy-backing. The problem is that Canadians cite US patents much less than expected — only 65 per cent as often as US patents cite previous US patents. Canadian firms clearly are not fully exploiting the knowledge made public by the US patent system.[19]

This disadvantage in knowledge dissipates with time, however.

It was suggested to the Committee that emphasis should not be placed on R&D per se, but on the adoption of new technologies:

> I really want to emphasize that to increase productivity and the standard of living in Canada, increasing R&D in Canada is not that critical. ... There are mounds of information that say there are spillover effects and whatever, but let's keep things in perspective: 2% of all of these new inventions and ideas out there are coming from Canada; 98% are coming from elsewhere. ... The key thing is, let's make sure that all those inventions and best-practice techniques

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[18] It has been argued that, prior to 1973, U.S. R&D boosted Canada's total factor productivity growth rate by about 0.9 percentage points and that this boost faltered to somewhere between 0.3 and 0.4 percentage points with the decline in U.S. R&D since 1973. See Bernstein, J. and T. Mamuneas, The Contribution of U.S. Spending to Manufacturing Productivity Growth in Canada, presented at the Centre for the Study of Living Standards' Conference, January 2000. One caveat though. Strangely, this paper does not use control variables to account for other contributing factors to the productivity slowdown, such as depressed aggregate demand in Canada in the 1990s or the possibility that Canadian managers failed to tap into U.S. R&D when compared to previous periods, and, therefore, does not adequately separate out R&D capital as a potential explanation. The Committee would like to thank Don Daly for pointing this out.

[19] Treffler, Daniel, "Does Canada Need A Productivity Budget?," Policy Options, 20, July 1999, p. 68.

> being developed out there in the world are brought into the Canadian factory and brought into the Canadian workplace. … We could double the amount of R&D done in Canada; it's not going to have near the wallop on our productivity and our standard of living as it will if we just improve this adaptation mechanism. [Dale Orr, 10:10:20]

Anecdotal evidence of insufficient technology adoption was provided to the Committee:

> You go into a lot of small companies and I've noticed that with companies using CAD, … computer aided design, computer automated manufacturing systems, they've replaced draftspeople who do this on paper now with these automated systems … but they're operating the CAD systems like word processors. They're not going the next step to integrate the automated design into the manufacturing end of the services, into the e-commerce that allows companies to connect with customers and supply chain. That too may change but it's something that I'm very very concerned about. [Jayson Myers, Alliance of Manufacturers & Exporters Canada, 28:11:50]

Hard evidence supporting these claims and anecdotes was provided to the Committee in a recent Statistics Canada study, two important conclusions of which bear directly on the rate of technology adoption in Canada:

> In the five industrial sectors — fabricated metal products, industrial machinery and equipment, electronic and electrical equipment, transportation equipment, and instruments and related products — … Canadian plant managers feel that Canada suffers a technological disadvantage. This is borne out by the technology use data. In these sectors, Canadian plants are less likely to use any advanced technology than U.S. plants, although the 'gap' has been halved with 73% of Canadian plants and 81% of U.S. plants using at least one technology.
>
> Much of the technology gap can be attributed primarily to differences in the size of markets. Canadian plant managers tend to place a greater emphasis on improvements in product flexibility or reductions in setup time as benefits of technology adoption and the need for market expansion as an impediment to technology is given relatively greater weight than it is in the United States.[20]

So Canada again falls victim to its small size. However, the Government of Canada has begun to address this deficiency through its innovation agenda and the tax relief it will provide to SMEs, as setout in *Budget 2000*. The Committee believes that this innovation agenda provides a solid foundation, but more initiatives will be needed to sustain the government's objectives and, therefore, recommends:

6. That the Government of Canada ensure that the application process for research and development tax credits by small and medium-sized businesses is streamlined and made user friendly.

And

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[20] Baldwin, J.R. and D. Sabourin, *Technology Adoption: A Comparison Between Canada and the United States*, August 1998, p. ix and 27.

7. **That the Government of Canada perform an information and demonstration service for Canadian businesses with respect to emerging and new technologies and processes with the objective of facilitating their transfer and adoption in Canada.**

And

8. **That the Government of Canada provide incentives for technology adoption that are specifically designed to enhance innovation in the manufacturing sector and in small and medium-sized businesses.**

Insufficient Capital Investment

Investment in physical capital, particularly M&E, has already been identified as a key determinant of productivity: workers are simply much more productive with more and better capital. Moreover, the newer this capital, the more likely it is to embody best practice technologies, thereby providing an additional stimulus to productivity. However, investment levels in Canada have not been good over the past three decades.

> One of the remarkable differences between the two countries has been the fact that capital per worker has consistently grown in the U.S. manufacturing sector, including through the '90s. While it had grown significantly through the late '80s, from 1990 through 1996, capital per worker declined significantly both in absolute and in growth rates [in Canada]. The order of magnitude here is absolutely staggering when one looks at this. … [I]t does suggest that there are some serious problems on the investment capital side. [Richard Harris, 20:16:05]

Two potential causes were identified:

> When you look at TFP [total factor productivity] there seems to be traditional convergence effects. To the extent that we seem to have a problem it is the investment problem. … [T]o the extent we have an investment problem which explains the labour productivity problem, it seeks an explanation ultimately in tax or exchange rates. [Richard Harris, 20:16:05]

The Committee will pursue these potential sources in Chapters 5 and 9, but feels that it is in no position to accurately identify the causes of our poor capital investment record in sufficient detail to prescribe remedies. However, another market watcher came to the Committee armed with the latest data on investment that suggest a turnaround.

> The level of investment in machinery and equipment in Canada actually declined a little in the first half of the 1990s, but a strong pickup in the second half of the decade enabled it to rise for the decade as a whole by nearly 90% — of about $73.5 billion in 1999, and we expect it will exceed $83 billion in 2001. As a percentage of GDP, it rose from 5.3% in 1990 to 8.5% in 1999. We would expect it to reach about 9% in 2001. [Peter Drake, TD Bank Financial Group, 22:9:05]

This is good news for the Canadian economy and, to the extent that high corporate taxes caused this poor historical performance, *Budget 2000* corrects the problem and is expected to stimulate brisk new investment over the next few years as was suggested to the Committee by one witness:

> I think … the budget does help to strengthen business confidence, particularly in the sense [that] it surprised us how far the government was willing to go in reducing the general corporate tax rate, seven percentage points is far more … than we were expecting … over a period of five years. And the one percentage point reduction next year is a good step [as it] does instil confidence that more reductions are to come. [Jayson Myers, 28:11:10]

Globalization, Foreign Direct Investment (FDI) and Free Trade

"Globalization" is the growing economic and political integration and interdependence of countries as a result of trade, investment, movement of persons and the dissemination of knowledge. At the centre of this globalization process have been multinational enterprises. These seemingly denationalized and borderless corporations, encouraged by recent advances in transportation and communications technologies, have begun to outsource the manufacture and assembly of selective (non-core competency) components of their complex products to affiliates and strategic allies across national borders, thereby taking advantage of the new trade environment sweeping the globe. In other words, the locations of critical stages of manufacture and assembly are being chosen to ensure that the entire production process more fully exploits competitive advantages wherever these exist, whether because of economies of scale, scope or learning by doing, or because of greater factor specialization. The business sectors of most industrialized countries have thus internationalized their activities, weaving an intricate web of linked activities around the world. This has implications for the products Canadians buy.

> If one considers the pedigree of any good or service, whether locally produced or acquired abroad, it is likely to reflect inputs from more than one country. Whether a stereotypical pattern, say, European design, … United States technology, Asian components and Canadian assembly or some other combination. That's even if a product or good is produced locally by a Canadian company, … it may well be the end product of a complex set of international transactions. The point of all these observations … is … to emphasise the point that trade is a two way street and openness means integration on a deep and thorough basis. In a dynamic sense, the integration of our economy into the larger global economy means that it co-evolves. The Canadian economy is co-evolving with the global economy. It is shaped by it and it is adapting to it. [John Curtis, Foreign Affairs and International Trade Canada, 19:9:10]

The economic effects of these new global strategies extend beyond corporate competitiveness and profitability. Both inward and outward FDI convey substantial economic benefits in the form of productivity gains arising from increased factor specialization, the faster diffusion of new technologies and products to host countries, and increased competition for domestic companies.

FDI is of increasing importance to Canada as a host country, but more as an outward investor. The outward stock of FDI originating from Canada has risen more than sixfold from US$22.6 billion in 1980 to US$156.6 billion in 1998, while its inward stock has risen more than two-and-a-half times, from US$54.2 billion to US$141.8 billion over the same period. Canada, in fact, became a net FDI exporter in 1997.[21] Moreover, the global integration of the Canadian economy that this investment entails also triggered increased specialization in the production of those goods and services in which the Canadian economy has a comparative advantage. Figure 3.1 showed Canadian productivity growth rates in natural resource industries outperforming those of the United States, while the converse was true in terms of the machinery and equipment industries.

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[21] United Nations, *World Investment Report 1999: Trends and Determinants*, 1999.

This globalization process, which is allied with declining costs for communications and transportation, appears to have begun in the early-1980s, but it is unclear what to make of the accompanying trend for Canada to receive less FDI relative to the rest of the world. In any event, it was suggested that we might be selling Canadian industry too cheaply to foreigners:

> [I]f you look at the actual investment in dollar terms, even controlling for inflation, there's been a large increase in foreign investment in Canada in the 1990s. Many foreign firms have decided to expand operations here or to take over a Canadian company, and that's linked in part to the low dollar. In fact, some Canadians have been complaining that we're selling all our companies to the Americans because the low value of the dollar means that it's so cheap to take over Canadian companies, that this is becoming a problem in terms of foreign ownership. [Andrew Sharpe, 8:10:50]

On the other most notable aspect of globalization, increased world trade flows were identified as a boost to Canadian productivity. The Committee will cite the results of a recent study of how reduced tariffs under the FTA have affected Canadian productivity.

> For industries that experienced average tariff cuts, the FTA raised the productivity by 0.6 per cent per year over the 1988-95 period. Industries that experienced large tariff cuts, productivity grew by 1.5 per cent per year. These are very large numbers. The FTA boosted productivity further by reallocating workers and investment out of low-end manufacturing and into high-end, product-innovation oriented manufacturing. By the narrow criterion of raising productivity, the Canada-US trade deal must be judged a success.[22]

The resilience shown by the Canadian manufacturing sector in terms of the amount of restructuring necessitated by the adoption of the FTA also proved to be surprising:

> I have to say speaking on behalf of the manufacturing sector in particular that this is a sector that many critics of free trade thought was going to go out of business 10 years ago. A lot of people said that Canada couldn't afford to have a manufacturing sector, that in opening up the markets to competition in free trade we would see the disappearance of major sectors of industry, furniture, clothing, textiles, distilling, wine and beer production and some standard sectors. As well, many people were concerned about the disappearance of many high-tech sectors and I'm very pleased to say that all of those predictions have been proved wrong… In fact, manufacturing has been the most dynamic sector of the Canadian economy creating over 400,000 net new jobs over the last six years. It's the sector that's leading in R&D activity, it's the leading sector in capital investment and our interest is to keep it that way. [Jayson Myers, 28:10:35]

What is surprising, however, is that the FTA did not bring more prosperity to Canada. The economists and trade experts prior to signing the FTA were predicting a convergence in productivity levels between Canada and the United States.

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[22] Treffler, Daniel, op.cit., p. 69.

> If you talk about productivity levels for total manufacturing, historically, Canada has been well below the United States in terms of levels of output per man-hour. If you include measures of capital and so on, the story is still the same. But the gap had been closing from about the 1950s ... It narrowed a bit through to about the mid-1970s. Since then we've slipped back relative to the United States. That's not what supporters of free trade had predicted. We had predicted that with free trade there would be a convergence in productivity levels in manufacturing toward the U.S. level, and that hasn't happened. Instead, it has widened. [Don Daly, 6:15:35]

Obviously, other factors were at play and further research is well warranted.

CHAPTER 4:

SMALL AND MEDIUM-SIZED BUSINESSES

In Chapter 1 the Committee noted that Canada had invested far less in physical capital, particularly M&E, than had the United States over the past three decades. The Committee was also told that the number of SMEs had grown disproportionately faster in Canada. While recognizing that SMEs, on average, have a lower capital-to-labour ratio than large corporations and, are thus relatively less productive, these two trends led the Committee to suspect that the composition of Canada's business sector was responsible for the widening productivity gap between workers in the manufacturing sectors of the two countries. Thus, this chapter examines this possible explanation for Canada's relatively poor productivity performance in manufacturing. The first section provides a portrait of SMEs in Canada, paying particular attention to their role in the economy. The second section describes what the Committee learned about SME productivity in the manufacturing sector. Finally, the third section addresses the chief perennial complaint of SMEs, their poor access to capital, and the possible impact of this on their productivity.

The Economic Contribution of SMEs in Canada

As elsewhere in the world, Canada's SMEs make up the overwhelming majority of businesses. As of June 1999, there were 1,830,668 SMEs of 1,833,005 registered businesses in Canada, accounting for more than 99.8% of businesses in the country; 99% of businesses have fewer than 100 employees; and 78% have fewer than 50 employees. Small businesses and large businesses dominate different industrial sectors of the economy. Of the total number of small businesses, 16% are engaged in retail trade, 14% are in construction, 13% are in business services, 11% are in other services, and only 5% are in manufacturing. This contrasts sharply with large businesses, where 23% of them are engaged in manufacturing, 21% are in wholesale trade, and 18% are in retail trade.[23]

SMEs also dominate the employment statistics. Using a definition of fewer than 300 employees per business establishment, (a stricter than usual definition of an SME) Industry Canada reports that SMEs created 175,000 new jobs between the second quarters of 1998 and 1999, accounting for more than 60% of the total employment gain in this period, a growth typical of the past decade. Consequently, of 11.8 million on business payrolls in Canada in 1999, SMEs accounted for some 6.2 million, representing more than 50% of total payroll employment.

The financial performances of SMEs are not as good as those of large businesses, however, as seen in Table 4.1, which presents the latest available financial data. Despite their greater number, SMEs account for only 40% of operating revenues and only 20% of operating profit.[24] Profit margins and returns on equity and capital employed also improve with business size; they are anywhere from 50% to more than 100% better for large businesses. While the data are limited to one fiscal year, the picture is not atypical of the recent past.

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[23] Industry Canada, Small Business Quarterly, Winter 2000, Vol. 1, No. 3, http://strategis.ic.gc.ca/html.

[24] SMEs are defined as businesses with fewer than 500 employees, in terms of their population, but are defined as businesses with less than $5 million in revenue, in terms of financial data.

Table 4.1

Financial Performance by Size of Business — 1997

Financial Performance	Small Businesses	Medium-sized Businesses	Large Businesses	All Businesses
Profit Margin	3.7%	4.7%	9.7%	8.0%
Return on Equity	6.6%	9.3%	10.0%	9.0%
Return on Capital Employed	4.9%	6.4%	7.5%	6.7%
Debt-to-Equity Ratio	1.8	1.4	1.1	1.3

Source: Statistics Canada, Catalogue no. 61-219, 1997

The capital structure of SMEs and large corporations also differ significantly. The debt-to-equity ratios of small businesses are much higher than those of medium-sized businesses, which, in turn, are much higher than those of large businesses. The more leveraged capital structure of small businesses has consequences; it provides less financial flexibility in economic downturns and, consequently, makes small businesses more susceptible to failure. A recent Industry Canada report on small business seems to confirm this. Between 1989 and 1996, the survival rates for new small businesses with fewer than 5 employees averaged 72.4% after 1 year, 44.3% after 3 years, and 32% after 5 years. The corresponding survival rates for newly formed SMEs employing between 5 and 100 employees were 89.9%, 67.3%, and 54.3%, respectively. Firm survival is clearly directly related to the size of an entrant business.[25]

Productivity in Small and Medium-Sized Manufacturing Companies

The greater employment growth and poorer financial performance of SMEs relative to large businesses over this period suggest a slower growth rate in the capital-to-labour ratio of SMEs. This does not bode well for their labour productivity. One witness was researching this very issue when he appeared before the Committee and he concluded that:

> [T]he relative levels in value added per employee between large plants and small plants … has [shown] a significant divergence from … the early 1970s through to the mid-1990s …. Relative to the United States, there has been a slight gain in the large plants vis-à-vis the U.S. national average, but for the small plants there has been a dramatic drop away. This pattern of lower productivity levels in the small establishments shows up also in lower wages, lower profits on average, etc. So there is a problem here in small business in terms of its productivity levels, particularly when the increases in employment have been so dramatic. [Don Daly, 6:15:35]

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[25] Industry Canada, Small Business Quarterly, Fall 1999, Vol. 1, No. 3., http://strategis.ic.gc.ca/.html.

The researcher's data further indicate that the larger Canadian manufacturing plants had labour productivity levels about 15% above the national average in 1973, which had grown to about 40% two decades later. On the other hand, the smaller plants had productivity levels about 15% below the national average in 1973, but this had grown to 30% two decades later. The gap of 30 percentage points between large and small plants in Canada in 1973 has thus grown to 70 points by 1992. Compared to the average U.S. plant, large Canadian plants, which had a somewhat higher productivity in 1977, had slightly improved their relative productivity by 1992. On the other hand, smaller Canadian plants had had a productivity of about 70% of that of the average U.S. plant in 1977, but by 1992 this had fallen to below 60%.[26]

Finally, the researcher's data point to low productivity levels being heavily concentrated in small Canadian-owned plants. The productivity of large Canadian-owned plants was comparable to that of large foreign-owned plants in Canada; however, small Canadian-owned plants were only about two-thirds as productive as small foreign-owned plants.

One explanation for this difference is the relative abilities of large and small businesses to access and adopt foreign R&D and technologies. Small Canadian-owned firms are at a disadvantage with small American-owned firms. The Committee was made aware of this innovation gap and its increase in the past decade.

> Plants whose ownership resides outside of Canada are more likely to use technologies than domestically owned plants and the magnitude of the difference in general has not declined. But some of the differences are related to size and once size is considered, there are differences in the rate at which different sized domestically controlled plants have been closing the gap with foreign controlled plants. In large plants, the difference has generally declined. This is not the case for medium and small plants. That the overall domestic adoption rates continue to be lower than foreign adoption rates in all of the major functional groups then is the result of relatively poorer performance in small and medium-sized plants.[27]

The functional groups to which the authors refer are advanced technologies related to: (1) design and engineering; (2) processing, fabrication and assembly; (3) automated handling systems; (4) inspection; (5) network communications; and (6) integration and control.

Other evidence was offered to the Committee:

> [In the 1980s] We found … both slowness in picking up new ideas and slowness in spreading the knowledge around and getting it right into the bowels and details of the work of the system. Since so many of the jobs in Canada are in small to medium-sized enterprises, how is the relevant knowledge and its application brought to bear on such enterprises? Don't worry too much about the big companies. Worry much more about how you can get these things into the small and medium-sized companies. [David Slater, 10:9:30]

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[26] Daly, Donald, Small Business in Canada-*U.S. Manufacturing Productivity and Cost Comparisons*, brief presented to the Committee, November 1999.

[27] Baldwin, J.R., E. Rama, and D. Sabourin, *Growth in Advanced Technology Use in Canadian Manufacturing During the 1990's*, Statistics Canada, 11F0019MPE No. 105, p. 24.

A second witness offered an additional plausible explanation for the productivity gap between large and small manufacturing plants in Canada:

> The gap in productivity levels is particularly high for small and medium-size firms. … Large firms are as productive as those in the U.S., which makes sense since large firms can, and will, relocate resources away from low-productivity plants and areas toward high-productivity plants, until productivity is almost equalized across all their plants. But this equalizing mechanism probably does not apply to smaller and non-multinational firms. Now, unfortunately for Canada, our output is highly dependent on small and medium-sized businesses; much more so than is the case in the U.S. So the fact that relative productivity is weaker in small firms does mean that we have much lower productivity overall. [Douglas Porter, Nesbitt Burns, 22:11:10]

This, of course, leads to the question of why Canada became more dependent on SMEs than the United States. Two witnesses were quick to point to Canada's favourable small business corporate tax structure.

> In terms of overall corporate profits taxation, the corporate tax rate in Canada is well above the OECD average. … But on the other hand, the corporate profits tax with respect to small business is really quite different in two respects. One is that the corporate profits tax on profits under $200,000 a year is substantially lower than [for those] above that. The second thing is that the treatment of dividends are fairly generous. The net effect of these is that I think this is one of the factors that has contributed to the more rapid increase in employment in Canada than in the United States … What it does is encourage small businesses to get started, but it also ensures that they stay small. I think the degree of potential distortion the effects of the corporate tax can have in terms of the whole business sector is unfortunate. [Don Daly, 6:15:40]

This tax distortion, according to the second witness, serves no legitimate economic purpose:

> The small business tax thing just is not a good idea. … [W]hat's looming for every small business is if you get past the following size, the marginal rate goes up. Where is the incentive structure there to get large? … [W]hat you see … is the proliferation of small businesses. Where an individual owns twelve small businesses … all of which get the lower tax. I mean … it's one of these quaint things, like it's quaint … to be nice to small businesses. But it serves no economic purpose other than quaintness. [Roger Martin, University of Toronto, 22:11:50]

These criticisms are anologous to those often made about the Canadian social services-tax structure, which it is charged, gives welfare recipients little incentive to return to work. Pointing out that a welfare recipient who takes a minimum-wage job loses all social benefits and faces something like a 100% effective tax rate for doing so, critics suggest that such individuals would be better off remaining on welfare. Similarly, a poorly designed corporate tax system can stunt the willingness of Canada's SMEs to grow.

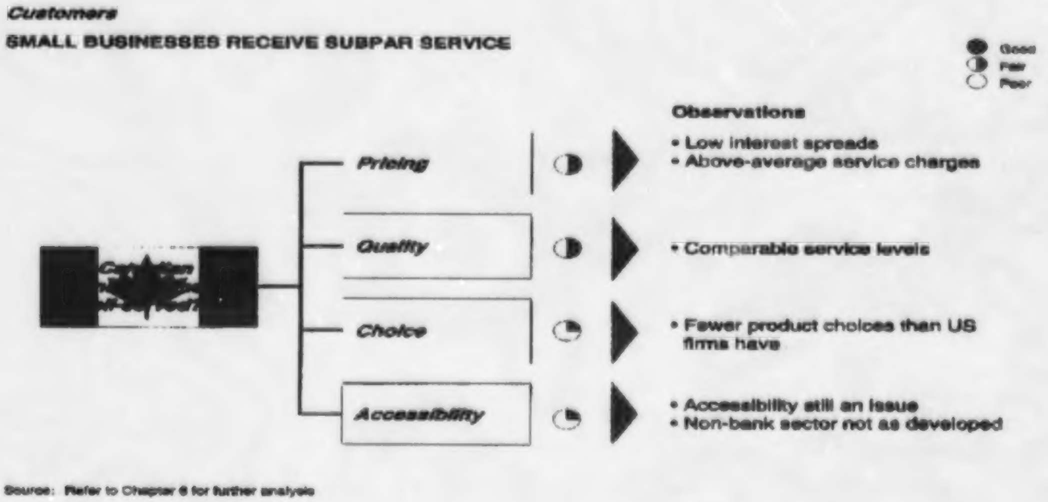
The Committee concludes that we should rethink the generosity of the corporate tax system to small businesses in Canada. Since this generosity is largely meant to compensate SMEs for their problems with access to capital, it might be expected to be favourable to their productivity. Furthermore, the Committee is also aware that *Budget 2000*, effective January 2001, will reduce the corporate tax rate for small businesses with taxable incomes between $200,000 and $300,000 from 28% to 21%. The same reduction will apply to larger businesses but will be phased-in over a more extended period. The Committee is inclined to believe that this tax reduction should ease the incremental tax burden of increasing the size of a business in the longer term, particularly since it should boost profitability and retained earnings. Profitability should improve an SME's access to loan capital, and retained earnings should provide additional internally generated capital for a firm to invest in M&E or R&D and thereby potentially raise productivity. In any event, more study is warranted. The Committee, therefore, recommends:

9. **That the Government of Canada study the corporate tax regime, including *Budget 2000* proposals, in terms of the incremental tax burden it may impose on small and medium-sized businesses. The objective of the study would be to ensure that Canadian entrepreneurs do not face a stiff tax penalty for growing their businesses and thus retain the incentive to contribute further to the Canadian economy.**

Equity and Loan Capital Constraints

The principal complaint of Canadian SMEs has always been their poor access to equity and, particularly loan capital (see Figure 4.1). Small businesses rate at somewhere between poor and fair the financial services provided to them in terms of pricing, quality, choice and accessibility.

Figure 4.1


Customers
SMALL BUSINESSES RECEIVE SUBPAR SERVICE
Good
Fair
Poor
Observations
Pricing
• Low interest spreads
• Above-average service charges
Quality
• Comparable service levels
Choice
• Fewer product choices than US firms have
Accessibility
• Accessibility still an issue
• Non-bank sector not as developed
Source: Refer to Chapter 6 for further analysis

Source: Exhibit 2-44, *The Changing Landscape for Canadian Financial Services: New Forces, New Competitors, New Choices*, McKinsey & Company Report for the Task Force on the Future of the Financial Services Sector, September 1998.

The McKinsey customer survey of financial services is comprehensive in terms of details; however, one must be cautious about drawing conclusions on the efficiency of the financial services market on the basis of its component parts, rather than the entire package. For example, one could interpret a small interest spread between depositor and loan rates as a sign of efficiency. One witness in fact implied this:

> You might know that if you compare the margins available in the U.S., the spread between rates at which loans are made and rates at which banks and other financial institutions borrow … that spread has been and continues to be significantly larger than in Canada so when you're talking about the competitiveness of the U.S. economy in comparative terms the fact of the matter is that whatever the suite of or range of products that are available to Canadians they are effectively cheaper than they are in the U.S. [Tim O'Neill, Canadian Bankers Association, 30:11:10]

If these small interest rate spreads are accompanied by poor accessibility and limited product choice, however, and the survey reveals this to be the case, they can be a sign of inefficiency, rather than the reverse. Financial service providers do not price their service offerings for the entire range of risks. They often choose to ration credit, declining those loan applicants who appear to them to be too risky rather than simply charging them a higher interest rate to cover the added risk. The larger American spreads, therefore, suggest that U.S. banks take on more risk in their loan portfolios than do Canadian banks. Finally, while it may seem that Canadian banks are less efficient than their American counterparts, this too may be wrong. Given that there seem to be fewer venture capitalist businesses in Canada (than in the United States) which could overcome these loan market deficiencies, it may be that the regulatory framework of the financial services market is really to blame.

> Our banking system is based on market imperfections. Market imperfections are for businesses that cannot get what they need … [I]n the eyes of the lender, they consider that the business is too risky for the return they get. In terms of size, we know that small business of a few thousand dollars does not generate lots of income, but it costs a lot of time for the people, the processes and so forth. So it is not attractive for people. [Luc Provencher, Business Development Bank of Canada, 27:9:45]

To some extent the Government of Canada already recognizes these deficiencies and is actively engaged in correcting them by supplementing the market in two ways: (1) guaranteeing loans approved under the *Small Business Loans Act*; and (2) creating the Business Development Bank of Canada (BDC), the Farm Credit Corporation, and the Export Development Corporation. In the case of the first Crown corporation, a BDC official explained its role as follows:

> There are still market imperfections in SMEs financing and BDC's role is to help fill this gap. Let me just give you a few of the gaps. In the risk gap, it can be the result of the business stage growth, its location, its economic cycle, or other factors. The size gap, because the costs of assessing loan applications are similar regardless of the size of the business. Knowledge gap, knowledge-based firms tend to have few physical assets that can be taken as collateral. Flexibility gap, the unwillingness to lend on flexible terms tailored to the needs of individual businesses. … BDC fills the gap identified on the previous slide by supplying financing to commercially viable enterprises. Our approach is a total solution, one-stop shopping, to offer financing, venture capital and consulting and management support. We have a network of over 80 branches, 1,000 employees and we have a virtual branch that connects all businesses across the country. [Luc Provencher, 27:9:20]

The BDC recognizes the importance of not being simply a substitute for a chartered bank — a notorious problem of its various predecessor companies. The governing act of the BDC must, therefore, be designed in such a way to allow the government to ensure that it plays a complementary role.

We are a complementary lender. The law was changed in 1995 and … it was changed to have a more dynamic approach with banking. At the same time, the government asked us, with the new mandate it was giving us, to promote partnerships — either with private and public businesses, first to get banking and credit unions and other partners — to go into more risky businesses with us and we've done over 42 partnerships that are currently working. We tried to fill that gap. [Luc Provencher, 27:9:45]

However, the financial services sector is also changing. New information technologies are knocking down historical barriers between the different financial market segments and between countries; and we are just beginning to see new service providers, not only of the "me too" variety of competitors, entering the marketplace.

> I think there are emerging alternatives … There are, for instance, organizations that specialize in what I call higher risk loans or lending. For instance, you have companies that are coming from the United States that are establishing themselves in Canada that are doing discounts on accounts receivable, factoring and so forth. We do have some Canadian companies, but it seems the market is relatively small in Canada and to be able to succeed in that you have to have some scale and scope as well. [Edmée Métivier, Canadian Bankers Association, 30:10:30]

Clearly, *Budget 2000* will help to encourage new venture capitalists to enter the Canadian market; it will allow venture capitalists and others to avoid capital gains taxes on the sale of shares from one small business where the proceeds from disposition are rolled over into another small business to a maximum of $500,000. SMEs with assets not exceeding $2.5 million before an investment is made, and $10 million after it is made, will be eligible for investments under this tax rollover provision.

If these new information technologies can rectify or close longstanding gaps in the loan market, it might be expected that institutional innovations by the chartered banks could overcome the problem of high turnover of loan officers, which is clearly harming the SME-banking relationship.

> CFIB makes a considerable study noting that a very significant obstacle for small business is high turnover among credit account managers. They note that firms unlucky enough to have been rotated through four or more managers during a three-year period are twice as likely to be rejected for business loans than customers with banks with a lower turnover. CFIB did a survey of lenders … and you'll note that … credit unions have the lowest turnover of credit managers of any financial institution in the system. The result turned out that we have the lowest loan rejection rate. So stability in our system and stability among our loaning managers is clearly a key competitive advantage for the credit union system and it's one of the key reasons why small business people seem to like doing business with credit unions. [Brian Topp, Credit Union Central of Canada, 27:9:10]

Moreover, in the knowledge-based economy to which we are headed, more significant capital access problems are likely to appear. Increasingly, the most valuable assets of a company are its so-called "human capital," which cannot be collateralized or made bankable under current loan arrangements. Large businesses will always have sufficient assets to act as collateral, but SMEs do not. What can be done to overcome this emerging problem?

> Bearing in mind that a financial institution is not a venture capital outfit. … [T]he long term solution is lending officers who understand the E-commerce world. Our banking rules are going to have to change so that you can figure out a way to express skills on a balance sheet and be able to lend against it. You're now into the cutting edge of the debate in the accounting business about how to deal with human capital. We're not there yet, but if the economy continues to evolve the way it's doing, we're going to have to get there. [Brian Topp, 27:10:50]

The Committee is hopeful that the regulatory reform of the financial services sector to be introduced later this year will provide the right incentive structure to ease market entry and provide more competition for SME customers in Canada.

CHAPTER 5:

PRODUCTIVITY, COMPETITIVENESS AND PROSPERITY

Productivity-Competitiveness-Prosperity Linkages

The three terms "productivity," "competitiveness" and "prosperity" can apply equally to people, firms, markets, or even society. In the modern economy, however, it is more useful to assign the concept of productivity to the firm, competitiveness to the marketplace, and prosperity to the nation-state. The rationale for this is that an individual's productivity is usually embodied in the products of firms; a firm's competitiveness provides many industry-wide spillovers and may reflect common resource pools and competition policy and regulatory frameworks; and, finally, prosperity is usually distributed over the country by some measure of government intervention. The Committee also relies on the hierarchical concept chain or linkages described by one witness as follows:

> [P]roductivity is a concept of the workplace. … I basically anchor the notion of productivity as a concept at the level of the firm … It is the base for competitiveness and for real income gains ... The notion of competitiveness is a concept of marketplaces. Here we're talking about the relative costs. These determine whether the operations of a firm will be sustainable, and indeed whether certain industry can continue. But even that is not what it's all about, because in fact that competitiveness in the marketplace is the base for or part of the story of what happens in society ... Prosperity is a societal concept that has to do with improvements in real income, in the quality of life, equity and environmental sustainability, all those being some of the goals. The simple point is you can have productivity growth and not achieve competitiveness; you can have competitiveness and not achieve prosperity. … [A]ctions are required all the way up that chain to be successful. [Michael McCracken, 8:9:40]

This hierarchical chain, if not stated explicitly, was implied by many witnesses who expressed the belief that productivity was the key to prosperity. Productivity is, therefore, not viewed as an end, but the means to obtain prosperity, where prosperity is taken to be something more than GDP per capita and to include distributional equity and personal and environmental health.

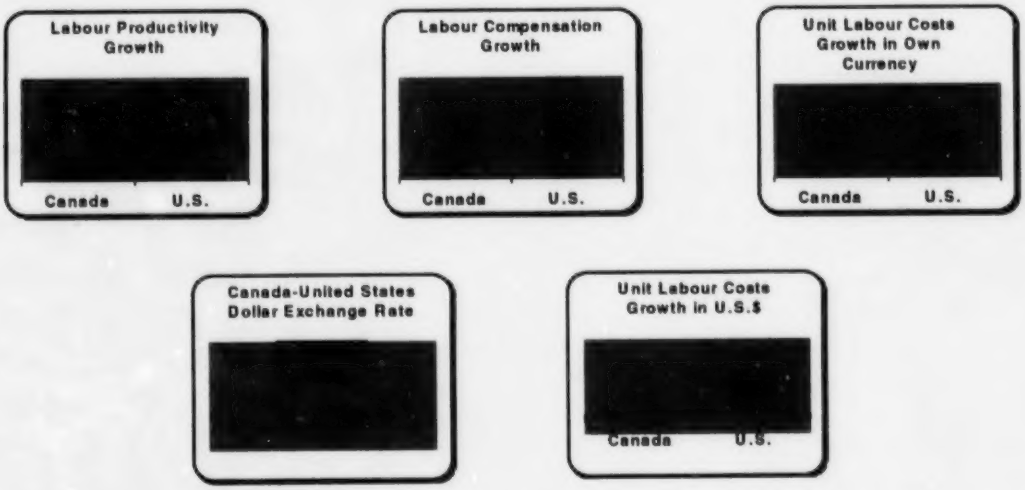
Canadian Business Sector Competitiveness

The link between the business sector's productivity and its competitiveness — at least in terms of costs — is simple. With some knowledge of average wage and currency exchange rates, labour productivity can, by a mathematical equation, be converted into labour costs per unit, the traditional measure for comparing the competitiveness of rival countries' business sectors. Indeed, comparing the performances of unit labour costs in a common currency over a significant period of time reflects fairly accurately the trends in the relative competitiveness of close competitor countries, like Canada and the United States.

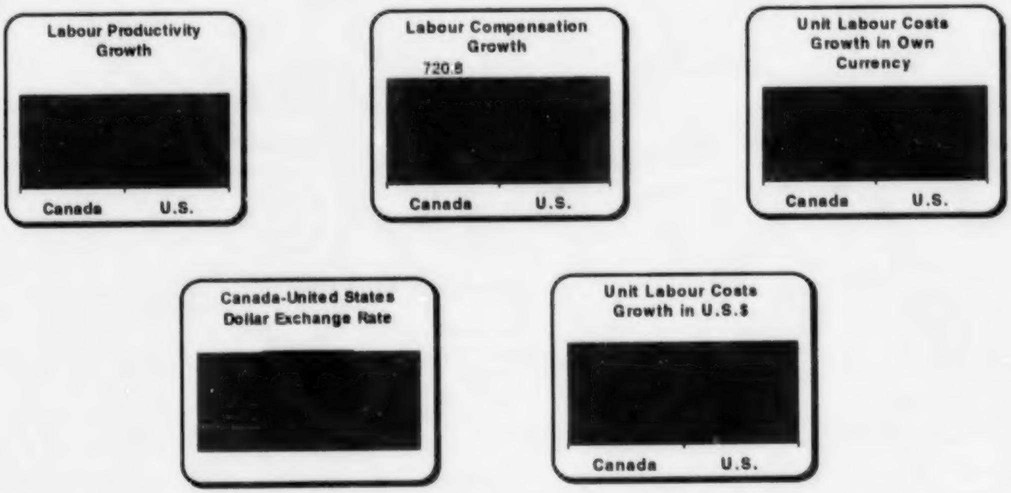
Figure 5.1

Productivity, Labour Compensation and Unit Labour Costs (in percentage points)

1989-1998



1966-1998



Source: Statistics Canada

Figure 5.1 illustrates the relative competitiveness of Canadian and American business sectors in two periods: the present business cycle, 1989-98 (the short term), and the past four business cycles, 1966-98 (the long term). The base year in which the index is set at 100 for either period is 1966 and 1989. Though both periods saw the value of the Canadian dollar depreciate relative to that of the U.S. dollar, which made Canada the more competitive of the two, in every other respect the performances of the two sectors were different. Indeed, the periods can be marked for the reversals in relative performances of the two countries in terms of labour productivity, wages and unit labour costs in their own currencies.

Over the past four decades, labour productivity in Canada has grown by 73.6 percentage points, which was 10 percentage points more than that in the United States. Canadian labour compensation exploded in this period, however, handing the American business sector about a 150 percentage point gain. In one's own currency, unit labour costs in Canada thus grew by 372.8 percentage points, which was 63.8 percentage points more than that in the United States. However, since the Canadian dollar depreciated by 25.2% in this period, this unit labour cost disadvantage was reversed in Canada's favour by 55.1 percentage points when converted into U.S. dollars. Alternatively put, the competitiveness of Canada's business sector improved by 13.5% relative to the United States business sector between 1966 and 1998.

In contrast, in the 1989-98 period, the competitiveness picture of the two countries was somewhat different as the growth in American productivity outperformed that in Canada by one percentage point (12.3 versus 11.3 percentage points). Growth in labour compensation was more restrained in Canada in this business cycle, providing the Canadian business sector with an 8.3 percentage point advantage (31.6 versus 39.9 percentage points). In one's own currency, unit labour costs in Canada thus grew by 18.2 percentage points, which was 6.4 percentage points less than in the United States. Again, since the Canadian dollar depreciated in the period, by 18.4%, the unit labour cost advantage was boosted further by 21.7 percentage points when converted into U.S. dollars. Alternatively put, the competitiveness of Canada's business sector improved by 28.1% relative to the United States business sector between 1989 and 1998 due to restrained wage settlements and a depreciated currency. Both events were the result of depressed domestic demand and adverse terms of trade with the decline in international primary commodity prices in the 1990s. The Committee was further counselled:

> Canada has made significant gains in terms of productivity and bringing our unit labour costs down. A large part of that is because of course with the falling dollar we've made significant gains in exports and in production. But where we do lag behind is in terms of innovation, in terms of investment, and in terms of the adoption and commercialization of new technology. … I think that is where Canadian industry really has to get its act together. [Jayson Myers, 28:10:45]

And:

> Because Canada's unit labour costs evaluated in U.S. dollar terms have fallen by 1.2% a year in the 1990s, our products have become cheaper. This has bolstered our competitiveness in U.S. markets, but it is also logical to conclude that this situation is hiding a fundamental problem: a weakening manufacturing competitiveness. This is the part of the debate around productivity that is so far missing and on which we think Canadians must focus. [Jim Frank, Conference Board of Canada, 8:9:15]

The data support these views. The Canadian dollar depreciated by 18.4% vis-à-vis the U.S. dollar in 1989-98, providing more than 77% of the improvement in the cost competitiveness of the Canadian business sector vis-à-vis the United States in that period. A depreciating currency is, therefore, an extremely effective way of boosting competitiveness both in the short and longer term, but particularly the former. However, productivity increases, accompanied by no more than matching wage and salary increases (in a non-inflationary environment), is the more effective competitiveness strategy since it does not involve a decline in the external value of wages, which is consistent with the objective of prosperity and an improving standard of living.

> We must understand that high incomes come from high productivity. The higher incomes of U.S. citizens are largely the result of their higher productivity and their ability to match compensation and productivity growth. In the end, their industrial competitiveness is reinforced by this capacity … [Jim Frank, 8:9:15]

The Committee concurs and believes that high productivity should become an imperative for Canada.

The Floating Dollar and the "Complacent" Canadian Businesses Debate

The evidence suggests that currency depreciation in the context of a floating exchange rate regime is an effective strategy for promoting competitiveness. Thus, currency depreciation does not appear to offer any drawbacks to competitiveness unless, of course, it inhibits the growth of productivity by indirect means. Some witnesses suggested exactly this; that a material decline in the value of a currency could in the long term impair productivity.

In the early-1970s, the Government of Canada decided to free the nation's dollar from its pegged rate with the U.S. dollar. Initially, the market saw fit to value the Canadian dollar in excess of par with the U.S. dollar, approaching a high of US$1.04 in 1976 (a period of high commodity and energy prices); however, since that time it has steadily declined to an all-time low of about US63¢ before rebounding to its current US68¢-70¢ range. The productivity of the Canadian manufacturing sector relative to that of the United States has also declined over most of this period, leading some researchers to propose a link between it and the exchange rate. They suggest that Canada's floating or depreciating dollar has, through one or more economic channels, spawned lazy Canadian businesses. The low value of the dollar acts as a crutch, relieving Canadian businesses from the need to make the necessary adjustments. Others, in the mainstream, hold the opposing view that the floating dollar, by rising and falling, helps to equilibrate external demand with internal production when the factors of production are not so immediately flexible to shocks.[28]

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[28] There are obviously other political (e.g. sovereignty/accountability) and economic (e.g. extra transactions costs related to currency risks, optimum currency areas, etc.) issues at play other than the possibility of complacent Canadian businesses.

One witness framed the debate in the following way:

> [T]here are two relationships between the Canadian dollar and productivity. The first is a hypothesis that because the dollar has fallen and reduced the unit costs in Canada, giving a bit of an advantage to Canadian exporters, it has given them a false sense of security, and it hasn't put the pressure on them to be as efficient as they should be. That's a hypothesis. ... Some people believe the low dollar has been a bit of an umbrella that has lulled some people to sleep. Others don't believe that. ... The fact is that the low dollar has made us more competitive, has given us more exports than we otherwise would have had, has pushed some factories closer to capacity than they otherwise would have been, has put people to work who otherwise wouldn't have been to work, and has given us economic growth we would not have had otherwise. [Dale Orr, 10:10:05]

The Committee would further repeat what it heard from other economic scholars appearing before it: a depreciating Canadian dollar could possibly mute the country's incentive to shift both labour and capital from our traditional commodity and low value-added manufacturing industries towards newer, more advanced, knowledge-based industries. This would happen since, it is alleged, the depreciating dollar transmits the "wrong price trends to producers." In effect, the relevant question is: Does the floating/depreciating dollar act as an economic "shock absorber" or "signal jammer"?

One researcher, while not proposing to link this fact to the depreciating Canadian dollar, contends that there is some evidence that the Canadian business sector has specialized too heavily in natural resource industries and low- and mid-tech, rather than high-tech, manufacturing industries. He suggests that Canada would have been better off following the same industrial pattern as the United States.[29] This is exactly what those arguing against a strategy of depreciating or floating the Canadian dollar would predict.[30]

Witnesses not impressed with the dollar depreciation argued that:

> Surely to goodness ... if 68¢ was a good idea, why don't we try 50¢? Depreciating our currency will not serve us well. ... At some point, there is a relationship between the cost of stuff we import and consume and our currency ... The reason we've been focusing on this issue around competitiveness and the Canadian dollar is that over a long enough period of time it's going to ... start to show up, and it will show up in weakened competitiveness in our industries. [Jim Frank, 8:10:05]

One witness proffered a "pressure pot" explanation for competitiveness:

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[29] Wolff, Edward, *Has Canada Specialized in the Wrong Manufacturing Industries*?, presented at the Centre for the Study of Living Standards' Conference, January 2000.

[30] There are other arguments that can potentially explain this result, including the possibility that misguided preferential Canadian tax laws provided companies the incentive to allocate their resources in these so-called wrong industries.

> Firms become globally competitive on the basis of dealing with pressure, having pressure put on them to make choices to be more innovative and be more clever in making investments. Pressure is a very good thing and whenever you release the pressure valve by lowering your currency that is bad for decision making in companies about how to compete in more sophisticated ways. I think in a couple of ways it is tragic what has happened to the Canadian dollar. It has made us poor; we've taken a 25% pay cut since … 1991 as Canadians. … It's bad for making us poorer and bad for taking pressure off our companies to make the kinds of choices that are necessary to compete. [Roger Martin, 22:11:30-11:35]

The Committee also heard a slightly different twist to the thesis of the complacent Canadian businesses:

> I'm not convinced that it's necessarily that our manufacturers get lulled into complacency. I think that what happens is that as the dollar declines, a lot of industries that are marginal and maybe wouldn't survive in the case of a higher dollar and perhaps lower productivity are able to survive because of the cheaper currency and that probably does tend to bring down our productivity numbers. … So I think there are a number of channels through which a lower dollar actually can depress productivity. [Douglas Porter, 22:11:30]

Yet some on the other side of the debate claim that Canadian manufacturers maintain a competitive advantage over Canadian resource industries for labour and capital with or without the depreciated Canadian dollar. We retain the incentive to shift resources from poorly performing sectors to the more promising sectors of the economy, whatever these sectors may be.

Other witnesses were largely non-committal:

> The first point I would make is that the low Canadian dollar is a temporary phenomenon. The Canadian dollar is not going to stay down there. One of the clear factors in making it low has been what has happened to primary commodity prices. Canada's terms of international trade have deteriorated more severely in this period than in almost any other period in our history, but that's not going to last forever. Terms of trade go up and down. Secondly, we also have to keep in mind about the Canadian dollar that we are still dependent on importing capital from abroad. This country has a deficiency of saving relative to investment. … Our national saving has been deficient. We therefore have had to continue to import capital. [David Slater, 10:10:05]

On this last point, the Committee was told:

> In 1979, … the price of capital services in Canada was roughly 20% more expensive than the United States. By 1995, capital was 90% more expensive in Canada. I want to point out, this is capital services, this is not the cost of capital, that is the cost of borrowing money. This represents what we call the user costs … of using a unit of capital services. Basic economics tells you that if you have a very large relative price increase like that it is not very surprising that you substitute labour for capital, as it appears to have gone, and exactly the opposite is true in the United States. So for whatever reasons, this remarkable divergence in relative input prices must be a part of the story about why Canada and the United States have had different productivity tracks. [Richard Harris, 20:16:10]

Accordingly, a relatively low Canadian dollar may be at least partly to blame:

> Now, with the expected exchange rate I actually don't think there's any question about it at all. I mean, in the 1990s, this dramatic change in relative prices that have occurred between capital and labour in the two countries is undoubtedly due to the real depreciation of the Canadian dollar. We import vast quantities of machinery and equipment. Even with the fact that we are very open, Canada's spending share of nominal M&E investment, relative to GDP, is 11% less than the United States. It's been a very dismal performance. ... So it's absolutely true the exchange rate depreciation has certainly accommodated Canadian firms in boosting output, but it has come at a long-run cost. And that long-run cost has been upgrading both new plants and new equipment. [Richard Harris, 20:16:20]

However, the Committee was reminded that, in an era of globalization, a relative price change in the factors of production means that the brunt of the currency depreciation will be borne by the least mobile factor, labour. In other words, Canadian workers, not capitalists, got poorer,[31] while Canadian firms retain a competitive advantage:

> On the dollar differential ... That's not really the case because they're buying capital at precisely the same price that the Canadian firms are. And in fact the Canadian firms have an advantage because they're acquiring cheaper labour in Canada that they're combining with the capital. They still have a net advantage over their U.S. competitors even if they're buying the same machine out of Philadelphia. [John Helliwell, University of British Columbia, 20:16:25]

In summary, then, a relatively low value for the Canadian dollar vis-à-vis the U.S. dollar provides short-term benefits in the form of greater external demand for Canadian goods and services than would otherwise be the case. Thus, a floating dollar performs the function of an economic "shock absorber" in the face of adverse trade shocks that affect Canada and the United States asymmetrically. This positive effect outweighs the higher capital costs in the short term for the following reason:

> Canada is a very large world trader and exporter and the low dollar means also that we are more competitive in selling our goods abroad. And since these capital goods that are needed to produce our exports are only a component of the total costs, the low dollar actually ... makes us more competitive even though we have to pay more for the capital input. [Jonathan Kesselman, University of British Columbia, 20:16:20]

Over the longer term, however, a depreciating currency may to some extent raise the relative cost of foreign capital, thereby blunting its accumulation, as well as the associated technical progress.[32] In this way, a floating dollar weakens the incentive for Canadian businesses to make the requisite structural adjustments in our economy and acts as an economic "signal jammer."

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[31] Young, mobile, highly-skilled workers would, of course, be able to avoid this fate by emigrating to the United States, something we will explore further in Chapter 8.

[32] Like the depreciating dollar/poor productivity growth correlation does not establish the cause and effect link between the variables — Canada's poor productivity growth relative to the United States could have triggered the Canadian dollar to depreciate in contrast to what was argued above — the relative capital services costs/depreciating Canadian dollar correlation does not establish the direction of cause and effect either; therefore, it could have been that the higher relative price of capital services in Canada triggered the Canadian dollar to depreciate.

The Committee sees merit in the arguments on both sides of this debate; ultimately, it is an empirical question as to which of the economic effects dominate. Since more research is clearly needed, the Committee recommends:

10. That the ministers of Industry and Finance jointly undertake a study of the floating Canadian dollar as it applies to the Canadian economy, devoting specific attention to its impact on the productivity and competitiveness of Canada's business sector.

In the end, one must remember that, as was explained in the previous section, the ultimate objective of economic behaviour is not competitiveness, but an improved standard of living and economic well-being for Canadians. In this respect, we, as a country, have not experienced the ideal situation, where competitiveness is enhanced at the same time as the currency appreciates. Such a "virtuous circle" was described to the Committee:

> The ideal circumstance is one in which, in a firm, we see and obtain higher productivity growth. This in turn allows higher real wages to be paid in that firm, which means higher real incomes for those Canadian workers. And by keeping that wage gain in line with the productivity gains we then also keep the firm competitive so its unit labour costs don't change, so it's still able to sell its goods abroad. Let's call it the "virtuous circle" that we're after. If we do that sufficiently we will in fact more likely see an appreciation of the exchange rate, which will bring with it an added benefit that will then allow Canadians to buy more goods abroad for the same number of Canadian dollars. It will result in an improvement in their real income. So what you want is what we call an earned appreciation — earned, because your productivity growth is rising. [Michael McCracken, 8:10:50]

The Canadian Standard of Living

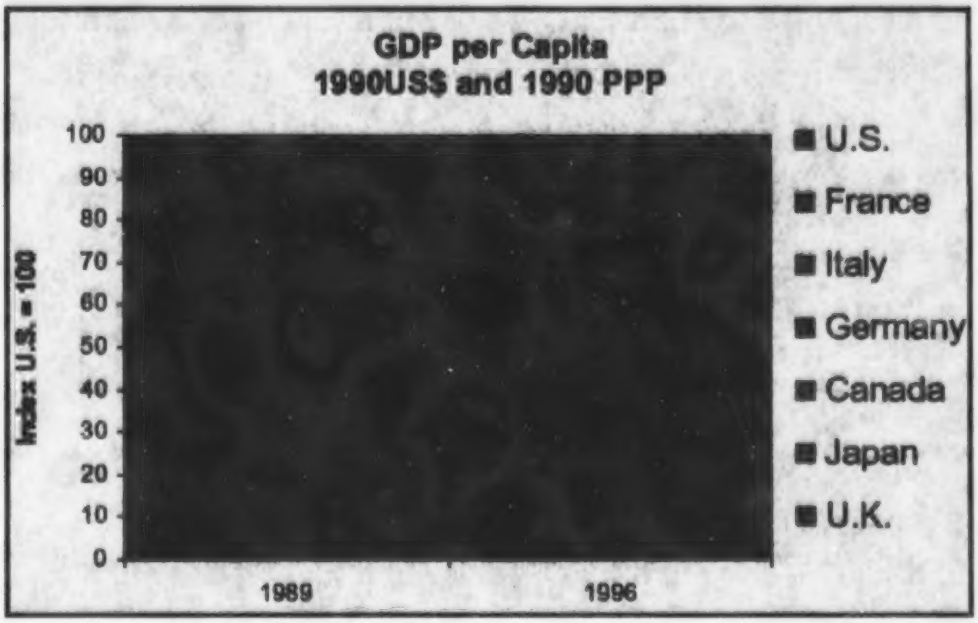
The standard of living is defined by the country's GDP per capita, which, for Canada, in 1998 was estimated at $29,357. In comparison, Industry Canada officials estimated the standard of living of the average American at $46,712, using a currency exchange rate of US67.4¢ per Canadian dollar, or $36,840, using an exchange rate of US85¢ as calculated by Statistics Canada's purchasing power parity formula.

> When we try to make comparisons across countries it is very difficult because we need to deal with the exchange rate and so on. If we use what is called the purchasing power parity — in other words, 85 cents is the purchasing power of a Canadian dollar in the U.S., ... I wouldn't say the true value of the dollar, but a more representative value of the dollar — then the difference of income per capita between Canada and the U.S. is $7,500 per year per person. If we use the exchange rate that prevailed at one point of 67 cents, this is $17,000. This is probably much too much. [Serge Nadeau, 2:9:35]

The standard of living gap between Canada and the United States is estimated to be between 20% and 40%, depending on which of these calculations was applied.

Figure 5.2, on the other hand, provides a broader comparison, illustrating levels of standard of living of the G-7 countries for the years 1989 and 1996. This diagram is based on an index, with the United States set at 100. For purposes of direct comparison, all G-7 country GDP per capita values have been converted to 1990 American dollars and corrected for any inflationary bias in the period. Given that the United States had the highest productivity of the G-7 countries, it is not surprising that it is the country with the highest standard of living in the world. While, at the beginning of this decade, Canada was in second place among the G-7 countries, it is now in fourth place, having being overtaken by Japan and Germany. The standard of living gap between Canada and the United States has also grown in this period, by five percentage points.

Figure 5.2



Source: Organisation for Economic Co-operation and Development

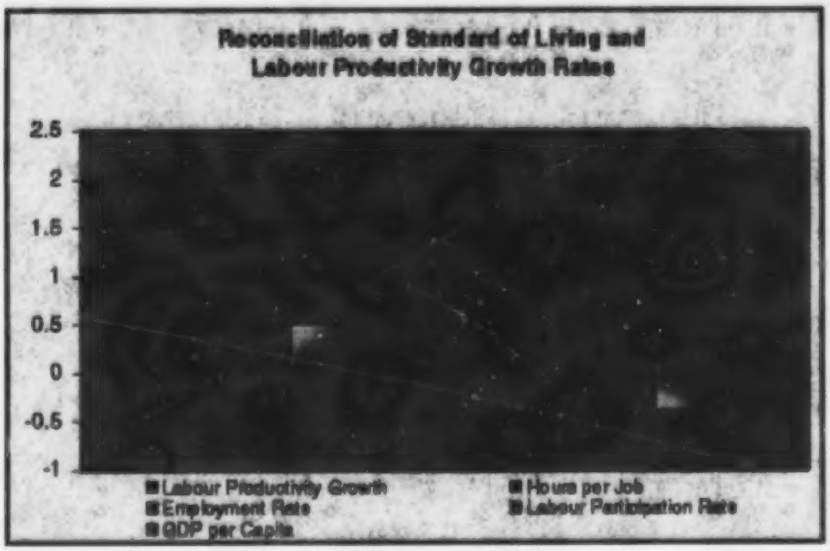
Reconciling Productivity and Standard of Living Performances

When one compares Canada's ranking for standard of living amongst the G-7 countries in 1989 and 1996 to its ranking for productivity in 1989 and 1997, there is a similar showing. Canada fell from second to fourth place in the former ranking and from second to fifth in the latter. Furthermore, the Canada-U.S. standard of living gap of 20% in 1989 widened to 25% in 1996, while the gap in productivity remained constant at about 20%. While there is an obvious link between productivity and standard of living, it is not a direct one. The Committee was provided with a precise mathematical formula:

> Standard of living as measured by output per capita is connected via an identity to a productivity measure. That identity is very simple. Output per capita, which is the standard of living … is equal to output per hours worked times the number of hours worked over the

> number of people in the economy. The two, output per capita and output per hours worked, should move closely together unless something happens to the third part of this equation, which is the number of hours worked per number of people in the economy. [John Baldwin, 2:9:15]

Figure 5.3



Source: Statistics Canada

Figure 5.3 illustrates Canada's productivity and standard of living performances over the last two business cycles using this mathematical formula; its performance was explained as follows:

> [W]hat happened in the 1990s explains the decline in our living standards. It's not productivity deteriorating; it's the fall in the employment-population ratio. In fact, if you look at GDP per worker, there's actually no deterioration at all in the 1990s compared to earlier periods. … It has been this fall in the employment-population ratio due to the higher unemployment and also, and even more importantly, due to the very large decline in our labour force participation. … Then we can get into a discussion of monetary policy, fiscal policy, which played a role in that slackening … [Andrew Sharpe, 8:10:00]

Additional causes were offered:

> Our standard of living is relatively low primarily because our productivity is relatively low. Besides having a relatively low output per worker — that is, productivity — we also have a relatively smaller fraction of our population employed … The main reasons why relatively fewer Canadians are employed are a lack of aggregate demand and relatively weak geographic mobility. People sit around year after year after year where unemployment rates are high and are unlikely to change. [Dale Orr, 10:9:20]

Figure 5.3, by and large, confirms these views. The growth rate of GDP per capita is smaller than that of labour productivity in 1989-98 by exactly the sum of the declines in the labour participation rate, the employment rate and hours per job in the period. This is the exact opposite of the 1981-89 period in which the growth in GDP per capita was greater than that of labour productivity. Labour participation, employment and hours per worker were all positive in that business cycle.

Canada's standard of living performance in the 1990s relative to that of the United States is also explained to the Committee:

> The reasons why our standard of living fell relative to that of the Americans over the 1990s was a relatively weaker labour market performance, not a relatively weaker productivity performance. We kept up with the Americans with respect to productivity over the 1990s, but we did not keep up to them with respect to standard of living. [Dale Orr, 10:9:20]

An Industry Canada official was even able to assign exact dollar values to both contributing factors:

> The reasons Canada has a lower standard of living than the U.S. are very simple. … Yes, in Canada there are not as many people working, and that explains about 4% of the gap … or $240 a year. The rest, the whole thing, 96%, is due to lower labour productivity. [Serge Nadeau, 2:9:35]

Productivity: Master or Servant? Servant to What Master?

A recurring theme in the testimony to the Committee was that the purpose of productivity is to improve the standard of living of Canadians. However, this Committee believes it is worthwhile to investigate further.

Clearly, productivity is not an end in itself, but a means to an end; it is servant, not master. But servant to what master? The Committee looks for an answer to this question in the relative performances of G-7 countries.

When one compares a country's standard of living to its productivity level in both 1989 and the mid-1990s, one discovers a few interesting patterns. Canada's standard of living relative to that of the United States closely matches its productivity level relative to that of the United States in both periods. That is, in 1989, Canada's standard of living and productivity were 81.7% and 82.2% of those of the United States; in 1996-97, these same figures were 76.7% and 81.3%. In contrast, Japan's standard of living outperforms its productivity level (relative to those of the United States) in both periods, while the productivity levels of the European countries (France, Germany, Italy and the U.K.) outperform their standard of living (relative to those of the United States) in both periods.

Given that the labour participation rate, employment rate and number of hours worked are factors that connect productivity and the standard of living, we can infer the labour market preferences of each G-7 country. Japan, more than any other G-7 country, devotes the rewards of its productivity to procuring a high standard of living; the Japanese work ethic and labour market policies ensure high labour participation and employment rates. Canada and the United States share a similar work ethic and somewhat similar labour market policies, ensuring that productivity in each country provides more balance between its standard of living and labour market outcomes than is the case for other G-7 countries. Finally, France, Germany, Italy and the U.K. ensure that their productivity procures an acceptable standard of living while tolerating the worst labour market outcomes of the G-7 countries (as a result of providing the most generous unemployment and other benefits).

The lesson learned from the above is that productivity can serve many masters; it need not be the single-minded servant of prosperity as measured solely by the standard of living. The appropriate work ethic must be factored into the decision-making process. Prosperity has many dimensions and the ends served by high productivity depend on a value judgment that each country must work out for itself.

PART II:

STRATEGIC DIRECTIONS FOR IMPROVING PRODUCTIVITY IN A KNOWLEDGE-BASED ECONOMY

CHAPTER 6: Economic Forces Driving Productivity

CHAPTER 7: Innovation, Innovation Systems and Intellectual Property

CHAPTER 8: Human Capital

CHAPTER 9: Macroeconomic Conditions and Taxation

CHAPTER 10: Eco-Efficiency in a Knowledge-Based Economy

CHAPTER 6:

ECONOMIC FORCES DRIVING PRODUCTIVITY

Economic Processes and Strategies

Throughout most of the Western World, the second millennium was host to unprecedented growth in material wealth which was largely achieved in two phases, with signs of another beginning at the dawn of the third millennium. The three phases are largely distinguished by their dominant economic processes: trade, industry, and innovation. Starting with the process of trade, Canada found a comparative advantage in its bountiful endowment of natural resources from its earliest settlement days by Europeans. The economic strategy of specializing production in extractive industries and honing its merchant talents proved to be very successful — one that persists and, in some sense, continues to dominate the efforts of the Canadian business sector today.

Beginning in the latter half of the nineteenth century, new advances in applied science, the increasing division of labour, and the development of more complex organizations promoted industry as the dominant means of achieving prosperity. This process, whereby the quantity and types of products are hugely increased by economies in production through scale and scope, relies primarily upon physical and financial capital. The size of an industrial nation in terms of population and capital stock, and not its natural resource endowment, thus became the predominant determinant of its wealth. Canada responded to these developments by adopting policies that would forge an industrial heartland centred in Ontario and Quebec, relying heavily on the importation of foreign capital and cutting-edge technologies. For a small and sparsely populated country, this proved to be a moderately successful economic strategy, but the recent opening up of foreign markets under the FTA and the business trend to globalization has leveraged this productivity-enhancing strategy.

The third millennium offers yet another economic option for achieving prosperity: innovation. Substantive breakthroughs in science have boosted rates of technical progress, in terms of both products and production technologies. Innovation is realized through the application of knowledge obtained from investments in R&D, particularly by adapting foreign R&D and diffusing it throughout the domestic economy. Knowledge, or "human capital," is the currency of these productivity gains. The Canadian business sector has yet to engage systematically in innovation on a wide enough scale to obtain a creative advantage over its foreign rivals and the country is only now coming to grips with the public policy challenges presented by this economic process.

Each of these three economic processes and strategies involves many forces that contribute in differing ways to higher productivity, including: (1) natural resource exploration and development; (2) international trade and interprovincial commerce; (3) investment, FDI and capital formation; (4) organizational capabilities and business strategies; (5) regulation and competition policy frameworks; (6) innovation, R&D and intellectual property; (7) human capital formation; and (8) macroeconomic conditions and taxation. The Committee will examine these productivity drivers in the sections that follow, except for the last three. Given that innovation, human capital and the corporate tax structure are the principal activity, resource and policy lever, respectively, of a knowledge-based economy, they will be discussed in separate chapters.

Natural Resource Exploration and Development

One of the oldest methods of boosting a nation's productivity is through exploration and development of natural resources. Indeed, the aggregate productivity level of a country or region often reflects the quantity and quality of its natural resource base. Consider, for example, a regional map of productivity in Canada. Productivity is highest in Ontario, Alberta, British Columbia and Quebec — in that order — depending, in part, on high value added per worker in natural resource industries. Productivity is lowest in Atlantic Canada, where the resource endowment is modest. More specifically, Alberta's leading productivity dynamo is the oil and gas industry; in British Columbia, it is coal and forestry sectors; and, in Quebec, leading industries are electrical power and metal mining.[33] Natural resources can also play a role in productivity growth. An obvious up-and-coming provincial contender on these terms would be Newfoundland and Labrador, based on the strengths of the Hibernia oil project and the forthcoming Voisey's Bay nickel project.

The Committee does not want to suggest that a country's endowment in natural resources will ultimately determine its productivity level. It was noted above that, among the G-7 countries with a relatively small natural resource sector, France, Italy and Japan are rated very highly in terms of their aggregate productivity. It can, in fact, be a more effective strategy to specialize in activities that are intensive in human and physical capital. Thus, a rich natural resource base does not guarantee a country high productivity, while a poor natural resource base does not condemn it to low productivity. Moreover, when the resource base is fugitive and easily depletable, for example a fishery, considerable management skill and husbandry are required to prevent an ecological and economic disaster. Careful attention to the productivity data of the Atlantic Canada fishery would have warned of the collapse of the cod stock. Finally, one of the lessons learned from this fishery should be that resource stewardship is less about increasing the fishing effort through the various government subsidies and more about fostering value-added production.

> There is still a very healthy crab fishery in Newfoundland. The crabs are caught, cleaned, frozen and shipped to Japan. We identified an opportunity to work with a major food company to process those crabs in Newfoundland into higher added-value products, in other words, gourmet food products for sale in Canadian and U.S. gourmet food stores, hence providing an opportunity for increased employment in Newfoundland compared to shipping the resource offshore. [Colin Isaacs, Institute for Sustainable Development, 22:9:40]

Some economic commentators even malign Canada for its success in natural resource development because they feel that this country is overly dependent on this activity. They point out that both the value of output in the natural resource sector as a percentage of GDP and commodity prices (discounted for inflation) have been declining for more than a century. But this price decline is certainly cause for further reflection:

> For most commodities over the 20th century, … there is a long-term decline in real prices. But the positive side of that story is … through a highly educated workforce and through

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[33] See Centre for the Study of Living Standards, op.cit., March 1998, tables in the appendix.

> continued application of the new technology we're able to deliver our product today in some cases for less than what we were delivering a product to market in 1920. That long-term decline in price should give the consumer comfort that there is no shortage on the horizon for these materials that are so needed, whether it's in the high-tech sector themselves, in the computer industry, aerospace industry, etc., we're able to deliver that product on a competitive basis. [Gordon Peeling, Mining Association of Canada, 23:17:15]

So Canadians are more productive and wealthier because of this specialization.

Other commentators would spin this negative sentiment in another direction, suggesting that, notwithstanding the above fishery example, because natural resources possess relatively little potential for value-added activity, differentiation and branding, they lend themselves to be sold on the basis of price alone. The traditional "hewers of wood and drawers of water" mentality could stunt Canada's business acumen and culture as we move to a knowledge-based economy in which value added and product differentiation through branding and other means are the dominant winning business strategies. The Committee feels that this conclusion is premature, however. Canada's future productivity would also depend on the flexibility and adaptability of its business sector and what we are told is the world-respected quality of its business schools.

International Trade and Interprovincial Commerce

Canada, as a relatively small economy, has always relied on foreign markets for its prosperity. Trade allows Canadian firms to expand their businesses beyond the national market, while giving Canadians access to the world's products and services on the best terms. This situation, as one witness put it, directly challenges Canadian businesses: "When we trade with other countries, we are obliged to become more competitive" [Serge Nadeau, 2:9:50]. More succinctly:

> [T]rade and competitiveness are inextricably linked. Canada has to be competitive in order to sell goods and services abroad, or even to sell goods and services domestically in Canada in the face of foreign competition. By the same token, given the fact that Canada accounts for a very small fraction of worldwide research and development and technological innovation we have to trade and embrace two-way, international, direct investment in order to acquire the capital equipment, the technology and, very importantly, the managerial and organizational skills that we need to be competitive. Given the fact that our Canadian market is only 2 per cent … of global gross domestic product, we have to trade to gain access to the economies of scale and scope that underlie competitiveness. We compete when we trade and we trade to be able to compete. It's that simple. [John Curtis, 19:9:15]

Canada is the largest per capita international trader of the G-7 countries and is one of the most open countries in the world; however, the Committee was told that Canada, somewhat paradoxically, is not a nation of traders:

> Canada is a trading country and is in fact the most open country in the world. However, we are not a country of exporters. Close to 25 per cent of our Canadian exports come from only five corporations. The rest comes from other companies but we find that close to 50 per cent of all our exports come from only 50 exporters. The five big Canadian exporters are the three automobile companies, IBM and the Canadian Wheat Board. [Serge Nadeau, 2:9:50]

However, these figures only point to the distribution of exports not being evenly balanced amongst Canadian exporters; other facts provide a slightly different picture.

> Indeed, five do dominate, but we have a number of larger companies that account for a large part of our volume of export. … We have an inventory of let's say 20,000 export-ready, export-prepared companies. [Louise Charron Fortin, Foreign Affairs and International Trade Canada, 19:11:00]

Canada is, as well, a leader in the international trade policy arena. This country has worked hard to establish an international trading system that is based on rules rather than power. As a middle-sized trading nation, Canada fares much better under this type of governance regime. In addition to our efforts at the multilateral level of the World Trade Organization (WTO), Canada has taken a multi-track approach that includes negotiating many bilateral agreements, such as the FTA in 1988, the Canada-Israel Free Trade Agreement in 1989, the North American Free Trade Agreement (NAFTA) in 1994, and the Canada-Chile Free Trade Agreement in 1997. Canada is also engaged in free trade talks under the aegis of the FTAA negotiations with the countries of the Organization of American States (OAS) and has similarly approached the European Union (EU), the European Free Trade Association (EFTA), and the Asia-Pacific Economic Cooperation (APEC) forum.

A trade agreement is not, in and of itself, a guarantee of more trade and efficient production. Market opportunities must be sought and pursued at some expense. An interesting question for the nation becomes: Is there a role for government in export promotion? In other words: How should such costs be shared between the government and potential exporters? The answer to the first question appears to be yes, in a limited way, as we were told of many services made available by the Department of Foreign Affairs and International Trade:

> Companies need information and intelligence to be successful, to maintain their competitiveness, to stay on the cutting edge. The department provides this through the production and regular updating of market reports. We currently have 560 reports covering approximately 25 sectors for virtually all our major trading partners. We produce 220 new updates per year. These reports are available on line, that is, all day, every day from anywhere in the world. Users need to have instant access to this information. The global market moves at a pace that, frankly, will leave the timid in its wake. We have 17,000 registered clients using these reports. [Louise Charron Fortin, 19:9:25]

The economic argument in support of these efforts was:

> When the focus shifts from sectors down to the firm and to the product level, we realize that while in the final analysis, it is the product that competes on the international marketplace, the actual product. It is not simply the product quality that determines success or even its price. The firm's marketing know-how, its distribution, its effectiveness of all the channels of distribution and its ability to forge partnerships internationally also come into play. So that's … at … the firm level. Then there are also country-specific features … Things such as branding, the "Made in Canada," which is and can be fostered by government export promotion activities … [John Curtis, 19:9:15]

Our performance in interprovincial trade and commerce is not so positive. Canada's trade is shifting from its domestic east-west orientation to one that is to the international and north-south axis and the gap between international and interprovincial trade has widened to more than 20 percentage points in favour of the former (about 40% of GDP versus 20%). Contributing factors include the FTA and the lack of strong internal trade rules in Canada's Agreement on Internal Trade. Interprovincial trade barriers are estimated to impose an annual cost of $7 billion, or a loss of 1% in GDP, on the Canadian economy, so that it is not surprising to hear that most trade experts believe it is easier for Canadians to trade abroad than at home.[34] From Canada's aerospace industry perspective:

> We find it absolutely bizarre that there are so many barriers between provinces in Canada both from a labour and a product and tariff perspective in that we have the experience of working globally, selling to 54 or 55 countries worldwide and often times it's easier to transport goods and services to those nations than it is to go between provinces … quite frankly, this country has just a tremendous potential for further growth but we have various barriers that have grown up over time that have become impediments to that growth and anything that we can encourage in a sense of further mobility of people, skill certification … We need to encourage much more … the smoothness with which both people and product can move across this nation. [This will lead to] a tremendous improvement in our productivity. [Peter Smith, Aerospace Industries Association of Canada, 25:10:00]

Not surprisingly, the Committee was advised to "eliminate the barriers to interprovincial trade and investment that fractured an already small economy."[35] The Committee agrees and recommends:

11. **That the Government of Canada pursue with the provinces an improved agreement on internal trade that would remove remaining barriers to interprovincial trade and include a dispute-settlement mechanism and enforcement provisions modeled on those of the North American Free Trade Agreement, but adapted to the national context.**

Domestic and Foreign Direct Investment and Capital Accumulation

Investment in physical capital, particularly material and equipment (M&E), has already been identified as a key determinant of productivity: workers are simply much more productive with more and better capital. Moreover, the newer this capital, the more likely it is to embody best practice technologies, thereby providing an additional stimulus to productivity. The Committee would further add that sound, stable and competitive financial systems promote the efficient transfer of private savings to the corporate sector for investment purposes. Here, the federal government can do much to modernize the legislative framework of the financial services sector to respond to the amazing technological change that is expanding the scope of financial service providers beyond national borders and across the historically confined pillars (bank, trusts, insurance and stock brokerage).

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[34] Agreement on Internal Trade Information Kit 1996.

[35] Porter, M. and R. Martin, *Canadian Competitiveness: Nine Years after the Crossroads*, presented at the Centre for the Study of Living Standards' Conference, January 2000, p. 6.

In June 1999, Finance Canada tabled its White Paper, entitled *Reforming Canada's Financial Services Sector*, in Parliament that addresses these and other stakeholder concerns. It recommends a number of changes, guided by the principles of promoting efficiency and growth, fostering domestic competition, empowering and protecting consumers of financial services and improving the regulatory environment and the government will soon provide legislation to implement these reforms. The Committee, therefore, recommends:

12. That the Government of Canada modernize its legislative framework in the financial services sector with the objective of enhancing productivity.

A longstanding feature of the Canadian economy is its heavy reliance on foreign capital as a source of employment and technology; however, after 1997, Canada for the first time became a net FDI investor country. Since the opening of global markets in the past two decades, Canadian companies have found it rewarding to invest abroad to better service their export customers. Trade and FDI are therefore no longer considered substitutes, where the latter takes place to overcome the tariff and non-tariff barriers imposed on the former, but as complements. As such, inward-bound FDI flows represented more than 10% of Canada's gross fixed capital formation in 1997, which would include private residential and commercial structures and M&E, while outward-bound FDI flows represented more than 19.2%.[36] On the global scene, Canada was ranked ninth as a recipient (US$16.5 billion) in 1998 and sixth as an investor (US$26.6 billion).

Impressive as these statistics are, they can still be improved. On the investor side, domestic firms must become more internationally focused; the new environment of globalization means that to be internationally competitive firms must implement global strategies of international trade and foreign investment. The high-demanding Canadian market provides an excellent home base from which to leverage their core products and production processes.

On the recipient side, the Committee was told that foreign firms in Canada are, by and large, more productive than domestic firms:

> Foreign direct investment is actually good for productivity. … To illustrate that indeed foreign investment is good, studies show that foreign-controlled firms are more productive than domestically controlled firms. … What we see is that there is a 13% gap overall between the Canadian-controlled and the foreign-controlled firms. So on average, foreign-controlled firms in Canada are 13% more productive than Canadian-controlled ones. [Serge Nadeau, 2:9:45]

Foreign firms not only represent an import source of R&D, they are also a significant domestic source:

> I grew up in a period of time when, effectively, we believed we were a branch plant economy. That phraseology was meant to imply that in some sense foreign firms operating in Canada were truncated. They didn't have a wide range of facilities. They did all of their R&D abroad, and, more importantly, they did less here than even domestic firms. Certainly the data over the last 15 years suggest that's not correct. We have an innovation survey from 1993 that suggests that foreign firms are more likely to do R&D in this country than domestic firms. When we

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[36] United Nations, op.cit., 1999.

> break down domestic firms into those that are multinationals or foreign oriented, we find very little difference between that group and the foreign group. But the foreign group is still slightly ahead in terms of their tendency to have an R&D facility and to do R&D on an ongoing basis in a separate department — all of those things that are in some sense more R&D intensive. They also report that they're introducing innovations more frequently than the domestic group of firms. [John Baldwin, 2:10:15]

Given the importance of FDI to competitiveness, and not withstanding the associated 45,000 jobs created from each $1 billion in FDI, the loss in relative share of North American destined FDI as reported in Chapter 3 deserves further investigation.[37] The magnitude and source of this problem was identified:

> [F]rom 1985 to 1998, … foreign direct investment has grown from about $90 billion to about $217 billion. These are the … stocks, if you will, so these are accumulative investments that foreign firms have made in Canada. If you look at that in the context of what's going on within North America and globally we would note that between 1985 and 1998 Canada's share of North America's inward foreign direct investments declined from about 25% to just over 13%. Over 90% of this decline is due to a reduction in Canada's share of U.S. outward FDIs. [Rocco Delvecchio, Industry Canada, 19:9:40]

This poor relative performance puts into question Canada's ability to compete in a knowledge-based economic environment.

> Increasingly, our sense is that the global economy, particularly in the developed economies, is moving from a resource based to more of a knowledge-based economy … Worthy of note is that in this context, knowledge-based industries are much more footloose than resource-based industries. In a sense you can't assume that some of the knowledge-based industries, for example, software development would be anchored in a particular region or part of the country or part of the world. It's part of the reality that makes the competition for investment, particularly a knowledge-based, high value-added high grow sectors that much more intense. [Rocco Delvecchio, 19:9:40]

Given these sets of circumstances, one witness questioned the reasoning behind Canada's imposition of foreign ownership restrictions in key high technology sectors.

> Certainly there's one area that's fully within the government's control and where, in my view, the government is shooting itself in the foot. With all of the interest in productivity, and everything Industry Canada has been doing on productivity, why in the world do we have foreign ownership restrictions on AT&T? Historically, AT&T has been responsible for more inventions than virtually any other corporation in the world. It's one of the most innovative companies in one of the most innovative and important sectors. [Dale Orr, 10:10:35]

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[37] Department of Foreign Affairs and International Trade, *Opening Doors to the World: Canada's International Market Access Priorities, 1999*, July 1999, Chapter 3, p. 1.

In the interest of fostering greater productivity and stronger competition, the Committee recommends:

13. That the Government of Canada evaluate the existing restrictions on foreign ownership imposed on the business community on a sector-by-sector basis and conduct an economic analysis of their benefits and costs.

And

14. That the Government of Canada review its regulatory and administrative processes for any impediments they may impose on investors in Canada and remove them when contrary to the public interest.

Organizational Capabilities and Business Strategies

The last century has seen tremendous change in the organization of the corporation. Originally, exploiting the vast economies of scale and scope inherent in new technologies required considerable managerial hierarchy, with top executives sending down instructions to be carried out by specialized divisions (e.g. production, purchasing, finance, sales and distribution, marketing, research). The range and structure of these divisions differed, but each required its own administration so that supervision, monitoring and control inevitably became more complex and demanding of the top executives of the firm. Operations on a vast scale also made a business vulnerable to hold-ups by key raw material suppliers and sub-assembly manufacturers. The response was often to implement a strategy of horizontal and vertical integration in order to preserve both the productivity of the business network and the profitability of its capital. Production capabilities in both the horizontal and the vertical dimension, however, required further attention to the coordination of the entire value-added chain.

In the end, pressures on management under this organizational form proved too much. As the scale and scope of firms continued to expand, performance indicators did not rise proportionately, making further re-engineering necessary. The solution was often a multi-unit enterprise, where top executives planned and allocated capital and resources to middle managers, who ran business units structured along specific product and/or geographical lines. These new divisions became profit centres; as before, they employed their own administration, but authority and responsibility for day-to-day business decisions were increasingly delegated to properly informed lower level managers and supervisors. Relieved of routine administration and tactical marketing responsibilities, top executives were able to devote their time and efforts to monitoring these middle managers and operating much like a miniature capital market.

Such organizational changes do not constitute a mere "re-ordering of the corporate deck chairs," they have consequences for the firm's overall productivity and profitability as the scale and scope of its activities rise. The Committee was told:

> Increases in productivity stem from improvements in knowledge and in production techniques, and these increases can occur because plants become larger or exploit scale economies or use higher quality labour or introduce better quality products. They can also arise from organizational changes in management or the way in which production is organized on the shop floor. [John Baldwin, 2:9:05]

The most recent efforts of corporate tinkerers and management gurus have actually propelled the corporation in the opposite direction. Corporate managers, now under pressure to raise productivity through innovation rather than through economies of scale, have focused on designing lean production capabilities and downsizing their core activities, while outsourcing non-core functions and sub-assembly activities. The de-layering of the management hierarchies and the building of multidisciplinary teams to take advantage of the diverse skill sets of the firm's workers have led to higher productivity. The successful business enterprise must, however, make sure that it outsources peripheral capacity rather than knowledge; which, given its distinctive and "footloose" character, must vigilantly be sought, combined, integrated and maintained.

On the issue of outsourcing, while the structure and organization of Canadian and American manufacturing sectors are thought to be very similar (that is other than their size), analysis of the productivity data reveals that Canada tends to outsource more readily than the United States:

> Now there's a number of curious things about the differences that have emerged between Canada and the U.S., and one of the most interesting is the fact that in the data it appears that Canadian manufacturing is using intermediate inputs at a rate of growth much faster than the United States. Over the last decade, Canadian inputs of what we would call intermediate inputs — you think of those as services, or goods and process — has grown at a rate of 30% faster than the United States. Now this is a very striking difference between the two countries, and as yet we have no systematic explanation of why this is true. One might be that there's been greater outsourcing going on. It might be that we have greater two-way flows in components between the countries, due to greater specialization, due to the free trade area. [Richard Harris, 20:16:10]

Beyond the structure and capabilities of any business organization are the endless tasks of achieving operational effectiveness and designing and implementing sound business strategies. Operational effectiveness can result from a number of new techniques, such as total quality management and "benchmarking." Corporate strategy, formerly dependent on market positioning in a rather static environment, has expanded its basic concepts for sustaining a competitive advantage, learning, and managing change in a dynamic environment. Indeed, the Committee was advised that corporate strategy was pivotal to competitiveness:

> The sophistication of a company's strategy and operations is a function of the key strategic choices they make and those choices determine the degree to which they make available to themselves the productivity and competitiveness levers that could be available to them. If they have a set of aspirations and goals that are low — a goal to actually only be a good Canadian company rather than a good global company — they'll make choices about where to play perhaps in Canada or a portion of Canada. And how to win? They may make a choice to try and win on the basis of low-cost labour or raw materials. Those kind of choices are inconsistent with increasing competitiveness and increasing productivity, and … there are a set of choices that are incompatible with competitiveness and incompatible with productivity increases versus support of a competitiveness. [Roger Martin, 22:10:55]

For some, corporate strategy and being competitive, in the end, boils down to being highly productive:

> Productivity improvement really has to be an integral part of any business strategy in Canadian industry today because open markets and very intense international competition and

> over-capacity in many sectors around the world mean that companies are simply not able to increase their prices as their cost of production goes up. … Canadian industry has done just that in the last 10 years and it's done it by doing two things. Number one is driving to greater cost efficiency. This means that companies are aiming to reduce all forms of overhead, they're driving to bring down inventories, they're contracting out goods and services that can be provided at less expense or higher levels of quality elsewhere, they're automating their production systems, they're reducing waste, they're reducing defect and they're reducing the need for produce rework and production set-up times. Today, the current jargon that many companies use is to accelerate throughput, this just means speeding up the production process as quickly as companies can in order to develop and manufacture and deliver products to their customers as quickly as possible before the competition. Companies are also reducing the space it takes to manufacture by adopting very flexible systems of automation. In terms of driving to reduce defects many companies are aiming at something called six-sigma status which three defects in one million. This is an objective that really changes the whole outlook on cost efficiency and productivity improvement on the whole way that companies run their manufacturing processes and the whole way that they are doing business. [Jayson Myers, 28:10:35]

In this context, the Committee was told that, despite a rather favourable microeconomic framework (e.g. competition policy, regulation, etc.), management in Canada compares unfavourably with that in our main competitor countries.

> Another possible reason for poor productivity performance is management. Canada has the the fourth best microeconomic environment in the world, according to the World Economic Forum. The microeconomic business environment here means competition laws, regulations, and so on. But in terms of company operations and strategy, we are ranked 12th, while the U.S., our major competitor, is ranked first. [Serge Nadeau, 2:9:55]

A more condemning interpretation was offered to the Committee:

> [A] problematic aspect is the nature of competitive advantage sought by Canadian companies. If the question is, on one hand, do our firms seek competitive advantage on the basis of low-cost labour and low-cost raw materials or, on the other hand, unique products and processes, we are much more to the side of low-cost labour and low-cost raw materials; 21st in the world on that ranking. In a similar study, we were 20th in the world in innovation, 19th on product design, 15th on control of international distribution. [Roger Martin, 22:10:55]

The *Global Competitiveness Report* further ranked Canada 17th for value chain presence and 14th for its extent of branding.

Clearly, the key to success in a knowledge-based work environment will be more demanding in terms of: (1) integration and coordination of the entire value-added chain; (2) attention to product innovation; and (3) the focus on product differentiation and branding. Noticeably different, and rather tricky, in the knowledge-based economy, is that a firm's innovative advantage is much more temporary than the competitive advantage realized through economies of scale. This is partly due to shorter product lifecycles, but also to keener competition in an environment where winning formulas are more easily discovered and copied. Furthermore, the production technologies of an innovative industry can change radically in a very short period of time; yesterday's outsourced non-core activity is today's core activity that must be brought back under direct control. The optimal mix of assets or production capabilities is much more in flux in an innovative economy. Hence, the quiet life is, for a top corporate executive, a thing of the past. Not surprisingly, the average tenure of a CEO of a large corporation has shortened considerably in the past few decades, while his or her salary has increased exponentially.

> In the final analysis, we have not found a single simple solution to improve our productivity. It is clear that many factors affect our ability to produce goods efficiently, and these include organizational effectiveness … At the organizational level, the ability of people to put all the pieces together depends on their basic skill sets. Their education levels and on-the-job training affect everything from their ability to make optimal use of equipment to their ability to take on new activities quickly and efficiently. ... The capability of management must not be overlooked as we seek ways to boost our performance. [Jim Frank, 8:9:15-9:20]

Regulation and Competition Policy Frameworks

Another important determinant to productivity and competitiveness is related to the country's regulatory and competition policy frameworks. Since the turn of the twentieth century, Canada has had such frameworks to deal with a variety of public concerns, most notably relating to monopoly and discrimination. As a small country, Canada grew up with an industrial economy featuring a few dominant corporations and business units in a number of key markets. A highly concentrated market structure is not always conducive to productivity or in the best interests of consumers and small businesses, however. The microeconomic framework thus featured regulatory and competition policy frameworks that had the legislative objective of complementing the efforts of those in the marketplace. One witness summed it up in the following terms:

> We elect a government as citizens to try to ensure that the policies and regulations that governments put on societies affect economics and … social structures [that] are sound and sensible. Market economies with no social accountability are very dangerous because the society in which you live ... [Fraser Mustard, Canadian Institute for Advanced Research, 22:10:10]

Yet another emphasized the need for reliability and predictability in the regulatory process:

> Having a strong regulatory capacity that is recognized as one of the best in the world is very important and has been recognized as such by the government. Having a reliable, predictable regulatory environment is absolutely critical to industrial development … and it also provides the public with the assurance and the confidence that any of the products that are reviewed are not only safe but effective. [Paul Hough, BIOTECanada, 25:15:40]

Obviously a careful balance must be struck between providing the right framework to give firms the incentive to seek out profitable opportunities in an efficient manner while imposing costly restrictions on their product characteristics and pricing structures in the interest of consumers. According to the *Global Competitiveness Report*, Canada has done a respectable job given its fourth place ranking. However, Canada cannot sit on its laurels in view of given the rapid development of the marketplace to a knowledge-based economy. Our regulatory and competition frameworks must change and adapt to these new circumstances.

The Committee sought to pursue this microeconomic aspect with respect to Canada's telecommunications sector, where rapid product and technological progress appears to be knocking down walls between formerly distinct communications industries: telephony, data communications, cable television, and entertainment. The Canadian Radio-Television and Telecommunications Commission (CRTC) has made relatively recent decisions to open up competition in long distance and local telephone services and broadcast distribution (satellite and wireless cable), as well as not to regulate the Internet under its broadcasting mandate. Its recent Telephone Service to High-Cost Serving Areas Decision will undoubtedly improve the competitiveness of Canada's small business sector in the country's more remote locations, particularly since the definition of basic services was expanded to include access to the Internet. This will undoubtedly reduce the likelihood that Canada's business landscape will be dotted with "have" and "have not" communities. Moreover, the CRTC vowed to the Committee that it would continue its trend to greater liberalization of the marketplace, given the increasing demands of consumers and the innovative products emerging in its jurisdictional scope.

> The Commission believes that competition is the best way to stimulate innovation in new products, new services and new price offerings. It is the best way to encourage the creation of new competitive communications businesses and jobs. Our role differs from other agencies. We have the mandate to place greater reliance on market forces while at the same time ensuring that consumers have access to affordable services ... Our primary emphasis … over the past several years has been to actively support market-driven competition as the primary means to promote consumer choice, foster innovation and the development of new services and new pricing options. [David Coville, Canadian Radio-Television and Telecommunications Commission, 26:15:20]

Consequently, this sector will increasingly come under the less intrusive jurisdiction of the competition policy framework.

However, with respect to another fast-growing high technology market — the pharmaceutical biotechnologies industry — the Committee was told that, though the regulatory burden was reasonable, insufficient funding and/or personnel was a concern. Industry spokespersons were notably displeased with the regulatory delays in getting products approved by Health Canada, which, they felt, were a significant detriment to their industry's productivity and competitiveness.

> [W]e recommend that a separate agency be established outside the Health Protection Branch to undertake approval reviews for biotechnology products. … "Canada slow to approve medical drugs" and the data shows Canada's target — of course by Health Canada — was 355 days. In fact from 1996 to 1998, Canada took 518 days to approve drug products, 160 days late. It's just not good enough. We're way behind the United States at 365 days, the U.K. at 308 days and Sweden at 371 days. These are our competitors. Time means money. We can't afford to lag behind like this. [Barry McLennan, Coalition for Biomedical and Health Research, 25:10:35]

The Government of Canada has just responded to this challenge. *Budget 2000* commits an additional $90 million in spending over the next 3 years to the regulation of biotechnology products and processes.

CHAPTER 7:

INNOVATION, INNOVATION SYSTEMS AND INTELLECTUAL PROPERTY

The Committee is convinced that, in the words of one witness, "innovation is the key to productivity growth and competitiveness. Innovation and productivity ... are inextricably linked" [Peter Smith, 25:9:10]. Unquestionably, the productivity agenda we propose must have an innovation component. In this chapter, the Committee first documents evidence of what is at least a spurt, and at most an upward trend, in innovation. The Committee then addresses three of four key factors to innovation: R&D, innovation systems and intellectual property protection. In terms of the fourth factor, access to and diffusion of product and technological progress, the Committee is of the opinion that the processes of competition and liberalization of markets (as dealt with elsewhere in this report) and recommendations 7 and 8 are sufficient for attaining our objectives.

Product and Process Innovation

The unprecedented growth in material wealth that was achieved by the Western World in the second millennium and to which the Committee briefly referred in the previous chapter does not simply reflect a quantitative increase in the same goods and services. The wealth that we enjoy today is largely composed of new commodities, processed from new technologies, and made of radically different materials. Indeed, people living at the beginning of the last millennium would surely find today's marketplace to be mostly made up of unheard of, and undreamed of, goods and services. This is because economic growth and wealth creation are by and large the result of product and process innovation. Over the longer term, as one witness put it:

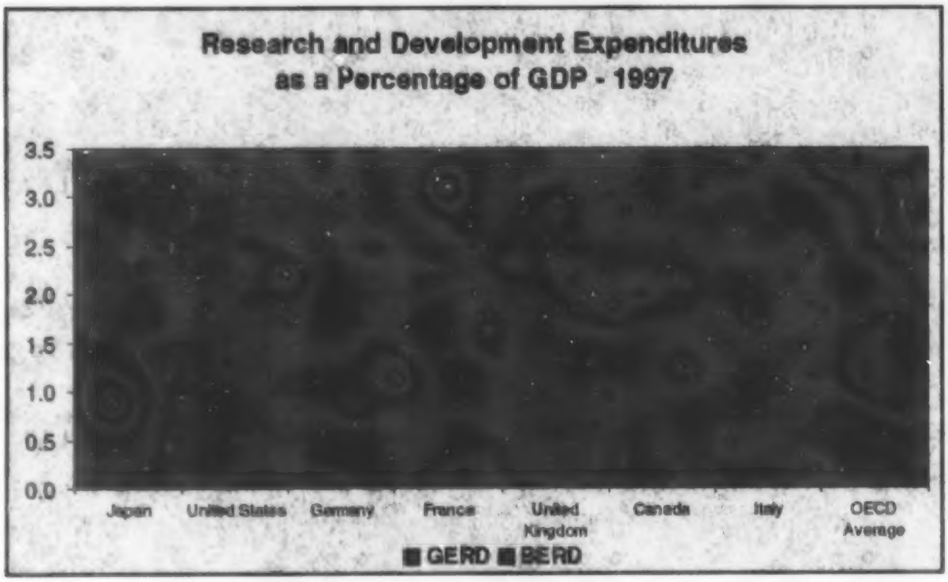
> Productivity or value added is highly dependent on innovation. ... The best way for a firm to increase value or wealth is to come up with a new product, a new idea or a new process. [Douglas Porter, 22:11:15]

Hand in hand with this process of "out with the old, in with the new," or "creative destruction" as it is sometimes called, comes the organizational and institutional innovation that were only roughly documented in the previous chapter. The generality of that discussion reflects the imprecision that characterizes the measuring of organizational and institutional innovation — an impression that carries over to the analysis of product and process innovation.

Today's knowledge-based economy is a fast-paced one spurred by product and process innovation. Anecdotal evidence is all around us. Product lifecycles are becoming shorter and shorter all the time; for example, the average life of a personal computer model on the market today is no more than six months; for computer software, it is about six months; and for semiconductors, it is about one to two years. Even our more traditional products are undergoing rapid transformation. For instance, automobile models that used to last about a decade without major design changes are now being revamped about every four to six years. The lifetime of a typical aircraft model has declined from about two decades to somewhat less than one. The same can be said about your standard utility services, like telephone and financial services. Although it is, more often than not, value-added special features that are supplementing the basic product offerings.

Not surprisingly, new information technologies resulting from the digital microprocessing revolution are often the dynamo driving many of these changes. This is not the sole source of change; major breakthroughs in genetics research are at the heart of the biotechnologies revolution that is altering the productivity and quality of our food and health systems.

Figure 7.1



GERD: Gross Domestic Expenditures on Research and Development
BERD: Business Enterprise Expenditures on Research and Development
Source: Organisation for Economic Co-operation and Development

Measuring the speed of innovation is fraught with difficulties, but probably the best indicators are expenditures on R&D per dollar of GDP and patenting trends. Careful attention to the data is required. The OECD reports that gross expenditures on R&D as a percentage of GDP have declined somewhat in the past decade. Typically, OECD countries devoted between 2.3% and 2.4% of their GDP to R&D in the 1980s. In the mid-1990s, this figure was typically 2.2% (see Figure 7.1). The OECD also reports that the inventiveness coefficient (number of patents per 10,000 inhabitants) of its member countries has hovered between 5.5% to 5.8% throughout the 1980s and 1990s, exhibiting no discernible upward or downward trend.

The steady application for patents, given the slight decline in R&D, points to a marginal increase in the productivity of R&D; hardly enough to account for the conventional wisdom that suggests there have recently been great strides in inventiveness. Indeed, the increase in the ratio of patent applications to R&D expenditures per GDP can, in part, be explained by improvements in the economic protection extended to patentees with the adoption of the World Intellectual Property Organization's (WIPO) Convention in 1970, followed by the WTO's 1996 Agreement on Trade-

Related Intellectual Property (TRIPs). Rather, the anecdotal evidence of increased inventiveness is supported by looking to the international diffusion of patenting activity.

The number of national patents filed in OECD countries each year between 1985 and 1996 has increased at an average annual compound rate of 8.4%; yet applications by residents increased only at a rate of 3.5% in this period. This suggests that patentees are increasingly applying for protection beyond their domestic borders. The statistics confirm this inference. The OECD reports the patent dependency ratio (non-resident-to-resident patent applications) throughout the OECD has increased from 1:1 in the mid-1980s to 2.3:1 in 1996. The rate of diffusion of patents (external-to-resident patent applications) within the OECD increased from 1.8:1 in 1990 to 4.3:1 in 1996. Two explanations are suggested: (1) the application of information technologies to the discovery process has elevated the productivity of R&D; and (2) the shift to applied R&D has increased the yield of patentable innovations.

The Canadian data are more striking. Canada actually bucked the trend to less R&D per dollar of GDP as this rose from about 1.4% in the 1980s to 1.6% in the mid-1990s (see Figure 7.1). From a longer term perspective, it may be that this figure is really oscillating about 1.5%. Canada's inventiveness coefficient remained fairly constant between 0.8% and 0.9% throughout the past 2 decades. National patenting grew at an average annual compound growth rate of 5.3% between 1985 and 1996, while resident patenting grew by 2.1% per year in this period. The OECD reports that the patent dependency ratio in Canada increased from 12:1 in the mid-1980s to 17.5:1 in 1996, while patents filed in other countries by Canadians increased the patent diffusion ratio from 6.2:1 in 1990 to 26.6:1 in 1996. Comparing these statistics to those of the OECD reveals that Canada is enjoying a greater acceleration in its pace of innovation than the average OECD country.

These data only confirm the Committee's view that it is not the level of R&D per se which will determine our level of innovation; rather it is the management of the limited R&D we do undertake which is particularly important and has had the greatest impact on the pace of innovation. Moreover, it is quite clear that innovation does not just happen randomnly or spontaneously, but is coached and can be stimulated. We, as a society, need to make sure that we develop, integrate and fine-tune all elements of our innovative systems in Canada to achieve greater productivity.

> The idea that an individual working in a laboratory is going to come up with an earth-shattering discovery that will create new industries and so on is pretty far-fetched. That may still happen. It does happen. But by and large, innovation is incremental and it happens largely by people sharing information. Innovation systems were about helping the institutions we already have talk better to one another, and share what they know and work collaboratively if that makes economic sense. [Peter Simeoni, Office of the Auditor General of Canada, 13:9:35]

It is clear that the globalization of ideas and innovation is here with us today, if only in embryonic form. In reality, to the extent that innovation systems exist, they are found and organized at the national level. Apart from international co-authored scientific research and the much publicized internationally funded space programs, multinationals, by feeding into these national innovation systems and through technology transfers (mostly by way of FDI), weave the only international web of innovative activity we see today. There is no overarching international institution that has overseen or coordinated this collaboration. What innovation occurred, has done so in a natural response to market forces.

The above patenting data also reveal that, as a small open economy, Canada piggybacks on more foreign R&D than do other OECD members and is more dependent on foreigners filing for patents, while Canadians themselves file patents elsewhere more frequently. Moreover, when we look at overall patent activity, that is in absolute terms, Canada lags significantly behind its major trading partner, the United States.

> [P]atenting activities in the U.S. are about three times higher than in Canada overall, but it's also across many sectors. It's even worse, for example, in computers and communications — very dynamic sectors — where the ratio is about four to one, and in electrical and electronics. Overall, we patent three times less, or maybe we are three times less innovative than the U.S., but it's four times in the most dynamic sectors. [Serge Nadeau, 2:9:50]

So, while Canada is experiencing an acceleration in its pace of innovation, it has a long way to go to catch up to countries such as the United States.

National Innovation Systems

Modern notions of innovation — how it occurs, what forces are at play and how they interact — appear to be heavily influenced by theoretical modelling, which typically emphasizes the cumulative and interactive nature of the innovative process. For example, according to the traditional linear model, innovation begins with basic research — experimental or theoretical work that adds to fundamental knowledge — which leads to other basic research or to applied research before moving on to product development and commercialization. This model branded the science system as the sole initiator of innovation and concluded that the largest economic spillovers came from basic research. Thus it stressed the need to focus on and increase resources devoted to basic research if we were to maximize the rate of innovation and technological change. In a complementary fashion, the public good (non-rivalrous) and non-exclusive (non-proprietary) nature of basic research means that an innovator cannot appropriate all the benefits associated with his or her invention; this could have the undesirable effect of stunting innovative activity. Without recourse to other institutional responses that would overcome the market's failure to capture these spillover benefits adequately, governments were encouraged to consider actively stepping in and providing incentives and funding to restore a healthier level of R&D activity.

Analyses of cases of innovation, however, revealed the linear model to be largely inaccurate; the innovation process is in fact much more complex. Innovation has many sources and can occur at any of the stages from basic research to applied research, to product development, to marketing and to product and process diffusion. Modern thinking on innovation has discarded the linear model for the feedback model, which emphasizes the ubiquity of spillover benefits generated at any point in the innovative process.

> Now let's just take a little bit more time to analyse how innovation works, because I mentioned that R&D and innovation are crucial to productivity. Innovation is not a linear thing. We used to talk about an innovation line or an innovation chain, but it isn't like that. Innovation is a complex phenomenon. It's a series of feedback loops in which all of the players interact all the time. [Arthur J. Carty, National Research Council of Canada, 3:15:55]

The policy implications of the feedback model of innovation are much more problematic than those of the linear model. Because the linear model confused pre-competitive R&D for basic research and generic technology for science, the policy task was simple: fund institutions engaged in basic research (universities, non-profit institutions and government agencies). Political problems arising from conflicting commercial interests were also comparatively non-existent under this policy framework. The feedback model, on the other hand, complicates policy-making because the principal spillover activities and the institutions from which they emerge are not immediately identifiable. Moreover, effective policy implementation necessarily entails involvement in proprietary research in some industries, while foresaking generic research in others. Finally, the correction of systemic failures stemming from institutional rigidities and insufficient collaboration and interaction within the system of innovation becomes equally as important as correcting market failures, if not more so.

Other factors can also contribute to the effectiveness of R&D in Canada:

> R&D is one of the real puzzles … to explain why Canada, which has the most rich fiscal incentives for industrial R&D, has the lowest R&D percentage in industry of all the G-7 countries? One of the reasons that's sometimes given is that the R&D is often a head office function that's kept close to the U.S. parents' head office and Canada with the largest share of U.S. ownership then sees the consequences of that. [John Helliwell, 20:16:50]

The Committee can only agree with one witness who summed up the government's policy-making task as follows:

> While there are more questions about innovation than answers at this moment, several matters are reasonably clear. Assessing the innovation performance of the economy is a multifaceted challenge for which little comprehensive information yet exists. Improving innovation performance depends on more than increased spending on R&D. It involves supporting research and development with the activities needed to embed new technologies in the economy and spending on research and development is not the only determinant of the Canadian economy's rate of productivity growth and may not be the most important one. [Richard Flageole, Office of the Auditor General of Canada, 13:9:05]

While innovation systems are essentially national, since national institutions finance and equip them, they are largely organized and executed at the local level.

> Let's have a look at a typical innovation system. … I would point out that innovation is often a local phenomenon. … I think you all know … that in communities the exchange of information, insights, and technology that can occur can often help spur economic growth by fostering clusters of firms. ... Now, any company that is going to be innovative in the knowledge-based economy has to clearly have access to R&D. It needs to either have its own R&D or it needs to find it, to interact with a player such as a government lab or a university. They need to have other elements of the science and technology structure, such as information sources. They need to know where the other sources of technology are and how they can access them. Government has a key role to play in this innovation system by providing the right environment in which innovation can occur by setting the policy and the regulation. It's also important, of course, to have highly trained people, and the educational institutions must

> be linked into this system of innovation. And firms need financing, so you have to have links to the financial sector. Any breakdown in these linkages shown by the connections here will make an ineffective innovation system. [Arthur J. Carty, 3:15:55]

These clusters of innovation emerged from several initiatives of the 1980s, and some are blossoming today. They are successfully exploiting agglomeration economies related to labour market pooling, specialized inputs and technological spillovers. Witnesses responded very positively to these government agency forays into collaboration with the private sector to date.

> National Centre of Excellence program. That was started in the last decade, or the 1980s decade, to be quite straight about it. That program was designed to build national clusters in chief knowledge fields. It's worked. You have groups of people in universities, in research laboratories across this country, working collaboratively on frontiers of knowledge. [Fraser Mustard, 22:9:35]

Since these clusters are a response to existing agglomeration economies, they inherently imply that there is a geographical element to innovation. Accordingly, innovation is better stimulated in communities large enough to support a university and research labs. The cluster most frequently mentioned to the Committee was the agro-biotechnology sector located in Saskatoon.

> Clusters of biotechnology firms are quite common not only in Canada, but in other countries, and Saskatoon is perhaps the best example of what can be achieved when all the different levels of government work with industry and the academic base. This situation in Canada did not arise by accident. There have been a number of factors involved including sustained government support. The government has long recognized biotechnology as an enabling or strategic one through the National Biotechnology Strategy that was initiated in 1983 through to the current Canadian Biotechnology Strategy and a number of other activities. [Paul Hough, 25:10:40]

Agglomeration economies clearly confer location advantages; however, probably the more significant conclusion from a Canadian perspective is that reliance on a strategy of piggybacking on U.S. R&D comes with a cost of slower product and technological diffusion. In other words, Canada suffers from a slower rate of innovation because it depends on industrial clusters of the United States for the fruits of their R&D. This, the Committee feels, must be reversed. While this piggybacking strategy may have been useful in an industrial economy setting and will likely continue for some time, maybe always, it is less likely to be useful in a knowledge-based economy.

> Investing in innovation capacity is critical to strengthen the Canadian productivity and competitiveness is the engine to growth of our economy. The status quo won't take Canada far in the global knowledge-based economy. Today the growing innovation gap threatens our economic future. We lag our competitors in R&D spending and in the adaptation and the fusion of new technologies. [Peter Smith, 25:9:10]

For the Committee, the operative question becomes: Do we, as a nation, want to move up the quality ladder from being a replicative economy to being an innovative economy? Is it economically worthwhile to do so? This Committee's answer to both these questions is in the affirmative.

As it was indicated to the Committee, in some sense, the Government of Canada has already started down this track:

> In this last budget, 1999, the government carried the process further … $1.8 billion was invested to support the creation, dissemination, and commercialization of knowledge in support of employment. There is a number of measures …, including $465 million over three years for the youth employment strategy and $110 million for the Canada jobs fund. I can list several initiatives to improve the capacity to produce knowledge: an extra $200 million this year for the Canada Foundation for Innovation; $75 million for NSERC; $15 million for the Social Sciences and Humanities Research Council; and $90 million over three years for the networks of centres of excellence. Those examples, just themselves, are $400 million. That's the investment on what I would call the research base side. If we look at the other side of the equation, the development side, there have been investments there as well, including $150 million for TPC. The Business Development Bank of Canada received $50 million of an equity injection. There was an investment in geomatics systems of $60 million over five years, and $60 million for Smart Communities. Again, the investments total more than $300 million. [Arthur J. Carty, 3:15:40]

A further boost was provided by the federal government in *Budget 2000*, putting an additional $1.9 billion into innovation, including Canada Foundation for Innovation, $900 million, Canada Research Chairs, $360 million, and Genome Canada, $160 million. One witness praised the government for its most recent $20 million contribution to PRECARN, an artificial intelligence and robotics industry-led consortium.

> I'll provide an example of an area in which in fact we are very strong and we are moving fast … The first one is robotics. This is the country that produced the Canada-Arm. We're very good in robotics and an investment that'll be made by PRECARN, and you would have seen that in yesterday's budget, they're moving in stage 3 of the spread of robotics and robotics technology into fields such as remote control mining which is much safer, all the way to robotics in the operating room so that you can perform surgery on a beating heart without stopping it and all sorts of applications in between. Canadians are very good in robotics and this is an area in which gradually we are beginning to move from pure technology push to some significant market pull. I think that's what we need. [Thomas Brzustowski, Natural Sciences and Engineering Research Council of Canada, 29:15:55]

R&D must play a greater part in Canadian businesses and Canada's research labs must become hives of activity. Since the Committee accepts R&D expenditures as a percentage of GDP to be the best indicator of raw innovative activity and believes that there is no magic R&D-to-GDP ratio that will optimize the amount of innovation in this country, we recommend:

15. **That the Government of Canada's innovation agenda commit to a five-year plan of increasing expenditures for research and development, ensuring that all of these increases are larger than the expected rate of inflation, with the objective of reinforcing the upward trend in Canada's R&D-to-GDP ratio established in the 1990s and to raise it above the G-7 country average.**

By recommending that there be increasing federal government contributions made at a faster pace than the inflation rate, the Committee avoids the pitfalls of past studies on R&D and innovation which set some arbitrary target of activity level. At this time in our history, it is sufficient to call for the continuation of the positive trend in R&D that started in the early-1990s and reinvigorated by *Budget 2000*.

An R&D Strategy for a Knowledge-based Economy

A rising R&D-to-GDP ratio in Canada is socially desirable in the period of transition to a knowledge-intensive economy, but to restrict our objectives so narrowly is not. The composition of these expenditures must be taken into account. The Committee understands that the recent increased productivity of R&D appears to be, at least in part, the result of a reallocation of resources from basic research to applied research. The Committee also appreciates that a continuous and unending skewing of resources towards applied research can produce a short-term spurt in innovation but with the cost of long-term stagnation. We, therefore, think that it is in Canada's best interests to have an appropriate balance between resources dedicated to basic and applied research, with the objective of sustaining this recent increased R&D productivity for the longer term.

The Committee believes that the government's contribution to R&D still needs more precision. The government's innovation initiative must seek out funding gaps, as one witness eloquently stated to the Committee:

> The thrust of my argument is that the investments have been focused in two principal areas: the research-based university side of R&D, and the industrial or development side. There is a critical area between these two sides that can be described as the innovation gap, and that's where we need to focus our attention in the future because it desperately needs some support. [Arthur J. Carty, 3:15:35]

The most apparent gap needing financial plugging was also suggested to the Committee:

> But in the middle of this spectrum, this research and development spectrum from basic research to development, there has been in fact very little happening. This is where the innovation gap lies. As the OECD has expressed it, our capacity to translate ideas into products for the marketplace is not as good as other countries. … We're facing major challenges, I think, because of that innovation gap. [Arthur J. Carty, 3:15:40]

The Committee heard considerable testimony praising the government's Industrial Research Assistance Program (IRAP) and Technology Partnerships Canada (TPC) programs. These programs can certainly be a part of the solution. However, the Committee agrees with the many witnesses who suggested that the National Research Council offers unique and specialized resources in this area and should form an integral part of the government's strategic response.

> Now, I would like to convince you that the National Research Council has all of the tools to be able to contribute to the solution to that innovation gap. The National Research Council is positioned, as you see, in the middle of that spectrum. We do carry out basic research and development, and in all of the areas in which we invest, we expect to be competitive with the best in the world. We also, in certain sectors, contribute substantially … to development. But our principal activity is bridging the gap, is actually working in partnership with other players

> — large and small enterprises, universities, and other government labs — to not only develop technology but also translate that technology into products for the marketplace. So we're very much an innovation organization. Were a knowledge and innovation organization. [Arthur J. Carty, 3:15:40]

The Committee would also repeat its recommendations for greater funding of the National Research Council made in its June 1999 report.

Beyond targeting the appropriate institutions and activities, there is always the perennial problem of managing R&D. Here, the Committee finds itself biased in favour of extensive collaboration and partnering approaches. This was a common theme of witnesses favouring innovation and more R&D.

> We need to increase Canadian firms capacities to invest in technology and innovation, promote and facilitate collaboration and partnering and technology development, establish key centres of excellence, strengthen the university research capabilities and university industry linkages and enhance small and medium-size enterprise access to patient capital necessary for innovation investments. [Peter Smith, 25:9:15]

As mentioned above, Canada already provides a generous and elaborate federal income tax benefits for R&D, consisting of tax deductions and investment tax credits (a general rate of 20%, but an enhanced rate of 35% rate up to $2 million for SMEs) for eligible current and capital expenditures. The definition of eligible R&D is consistent with the internationally accepted definition used by the OECD and includes basic research, applied research, and experimental development. However, one witness pointed out a shortcoming in Canada's definition:

> As I understand it, if you think about an idea and the process of getting it in, adapting it, doing pilot studies, and so on, from the time you get a thing in, in the first instance, do the immediate R&D on it, to the time when you have a successful application is often five years. It's an investment process. A large chunk of that investment process — pilot studies and all that sort of stuff — doesn't fall under the R&D provisions. [David Slater, 10:10:20]

Another witness identified considerable administrative problems surrounding the Scientific Research and Experimental Development (SR&ED) tax incentive program, which, in 1992 alone, was reported to have stimulated Canadian businesses into partnering more than $5.65 billion of their funds with $1.25 billion of SR&ED funds. Apparently, in the past several years, Revenue Canada's interpretative practices and administrative practices, combined with "forensic-like" auditing, have become confrontational and so burdensome that some innovative companies have abandonned the program.[38]

> One of the problems with the R&D tax credit system is a great deal of uncertainty that's surrounding the rules governing that system and the actual operation of that system. And this is an issue that Revenue Canada … has been dealing with for two years and is still a major problem that has to be resolved soon. Because what is happening is the business confidence in this system is being eroded and I know many small companies that are not applying for the

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[38] Canadian Advanced Technology Association et al., *The Fedral System of Scientific Research and Experimental Development Tax Incentives: Renewing the Partnership Through Consensus, Consistency and Predictability*, May 1998.

> R&D tax credit system because of the bureaucratic problems that they've run into, the administrative problems that they've run into, and the fact that the rules seem to be changing on a daily basis. They don't know where ground zero is. [Jayson Myers 28:11:25]

While the Committee is in no position to adjudicate or resolve this dispute, it fully recognizes the new economic environment requires new and innovative R&D policies that demand more collaboration between government and the private sector. Our R&D policies cannot rely solely on government labs; a solution to this problem must be found.

Intellectual Property Protection

An important industrial tool fostering innovation has been the creation of the intellectual property right. Society has long recognized that information, when held privately (and in the right hands), rather than publicly, is a source of personal wealth. On the other hand, when such information is broadly available, it will likely be put to use by others and thus it will produce little, if any, personal wealth. Lacking the ability to capture the wealth flowing from any novel piece of information, an individual has little incentive to disclose it; thus, entrepreneurs will not be able to make use of the information and the economy will not be what it could otherwise have been. Therefore, making use of the fact that all knowledge has characteristics of a public good, whereby one's use of it does not affect another's, the creation of a property right in knowledge rewards innovative efforts commensurate with its commercial prospects.

While inventors have other means at their disposal for protecting against encroachment on their inventions — most notably, trade secrecy contracts and access to unique co-specialized assets — many sectors of the economy depend heavily on the intellectual property right in order to appropriate the benefits of their discoveries. This is why the Committee was told that we need "strong microeconomic fundamentals … such as a business-friendly legal/institutional/regulatory frameworks such as effective intellectual property norms and enforcement" [John Curtis, 19:9:15] and that "standards are important. We need to manage intellectual property. We need to think ahead to what is coming next in terms of technologies, what will be the next disruptive technology, what will be the next breakthrough" [Arthur Carty, 3:15:55].

From society's perspective, the power to exclude others from the use of the knowledge uncovered and embodied in the property right unless compensation is paid to the individual who discovered that knowledge encourages rivals to innovate in return for the public disclosure of the discovery. Private information is therefore profitably made public.

Intellectual property rights, in this case patents, all possess the following attributes: eligibility for the right; the duration of the right; the breadth of the right; the novelty requirement; and access requirements. In short, the longer the duration, the greater the breadth, the more burdensome the novelty requirement, or the less imposing the access requirements entailed in the right, the harder it will subsequently be to "invent around" this invention, the less likely there will be follow-on inventions, and the more likely that potential competitors will be stifled. The converse is also true. This does not mean that the high technology markets will be prone to monopoly; alternative products, technologies and production processes will remain a perennial source of competition.

A rivalry of the sort created by an intellectual property right is not without its costs to society. All incentives for innovation, including the intellectual property right, suffer in varying measures from the *racing* environment created. First would be that the "winner-take-all" aspect of the tournament often leads to duplicative and wasteful R&D. Second, the power to exclude others results in a less than optimal pace of technological diffusion; however, without the right to exclude, there will often be nothing to diffuse. Society must therefore make a tradeoff; for this reason an effective intellectual property rights regime is best accompanied by a strong and effective competition policy regime.

In a modern developed economy that is knowledge-based, there will be too much competition in R&D activities and too little competition in the use of the discoveries; however, this fact has become increasingly irrelevant. The net benefits of an intellectual property rights regime are now, in a knowledge-based economy, demonstrably positive. Canada is also signatory to the TRIPs agreement and is in the process of becoming fully compliant. The Committee recommends:

16. **That the Government of Canada strengthen our national policy on intellectual property to achieve, at a minimum, a standard consistent with our international commitments with the objective of encouraging investment and innovation.**

CHAPTER 8:

HUMAN CAPITAL

The quintessential resource of today's knowledge-based economy is human capital. Physical and financial capital, which replaced natural resources and energy development in the move to an industrial economy, are increasingly giving way to knowledge as the dominant economic building block. The successful societies, economies, firms and people will be those that create, combine and integrate knowledge into their activities. From an economic welfare perspective, obviously the creation of knowledge and work skills must be sufficient in quantity, quality and diversity to meet the needs of a modern society. The combination of knowledge workers who have knowledge-intensive employment opportunities implies that appropriate matches are being made, yielding as little labour turnover and leakages as possible. Finally, the integration of knowledge workers with knowledge jobs, provided it is complemented by efficient work rules and institutions, will ensure maximum effort and the highest productivity.

Education, Skills Training and Lifelong Learning

Clearly, the toughest of the three challenges is creating knowledge, but the Committee will begin with the most obvious fact: "The primary determinants of the health and well being … in terms of physical and mental health is what happened to you in the first six years of your life" [Fraser Mustard, 22:9:35]. Lifelong learning begins in early childhood and the payments society will make to overcome any deficiencies encountered in this personal development stage will be enormous and largely wasteful when one considers that it is mostly preventable.

The market for skilled workers may provide the incentive for people to acquire knowledge and, indeed, one witness put this view in terms of the educational and skills profiles of successful workers in Canada:

> [A] skilled labour force is also extremely important for productivity. The only jobs that have been created since 1990 have been jobs for post-secondary graduates. As a matter of fact, in the aggregate, only post-secondary graduates found jobs during the past ten years, which shows very clearly that we are in a knowledge economy. … Canada's performance has been very good as far as skilled workers are concerned. As a matter of fact, we come first in the rankings of the *Global Competitiveness Report*. We have the highest number of university enrollments. [Serge Nadeau, 2:9:50]

The Committee would even subscribe to the view that, just as those with immediate access to financial capital benefited disproportionately in an industrial economy, it is the educated individuals who will get the lion's share of the rewards of a knowledge-based economy. Nevertheless, a preponderance of evidence suggests that the current educational and work training systems are inadequate for meeting the market's current demands for skills, let alone the vastly increased demands of the future. Quantitatively, the educational background brought to the labour force is improving, but employers are discovering shortcomings in its quality.

> The international adult literacy survey has three different areas ...All we're showing you here is document literacy. There are five scales. Level one is the bottom and level five is the top. ... in Canada, about 41% of our adults are at levels one and two of document literacy. In manufacturing, ... it's 52% in the lowest two levels. In practical terms, level one literacy says you cannot read and write. Level two says you can do a little bit of that, but you'd have trouble filling out a job application form ... . [Jim Frank, 8:10:10]

They are also finding shortcomings in its diversity:

> The second major impediment to productivity improvement that's identified by over 50% of our companies is the lack of qualified and skilled personnel. And these are skills that are not only traditional manufacturing skills, they're skills and expertise in manufacturing management and engineering, in design, in marketing, in international marketing, these are the new skills today, software development, information technology. They're skills that are required by all sectors of Canadian manufacturing not just the high tech product sectors, but the high tech processing sectors as well. Partially it's a problem that we simply aren't graduating the people from our universities, from our colleges, from our apprenticeship programs with the skills that modern manufacturing requires. But it's also, of course, I think again a reflection of the financial limitations that companies face that they don't have the finances that are adequate to increase the training within companies as well. [Jayson Myers, 28:10:45]

The Committee, therefore, recommends:

17. That the Government of Canada establish an immigration pilot project for facilitating the entry of foreign skilled workers to address labour shortages in the manufacturing sector.

In terms of Canada's record for skills training, the Committee was told that "we are only thirteenth in the [*Global Competitiveness Report*] rankings and we may be lagging in comparison to other countries" [Serge Nadeau, 2:9:50]. A generic explanation was offered:

> One of the reasons companies put forth as to why they do such a limited amount of retraining is high turnover. We tend to have a higher rate of turnover, of people moving from job to job, in Canada and the United States. Companies are concerned that if they put training into individuals, they can move and the benefits will accrue to the next company. [Don Daly, 6:16:10]

Thus, the ability to transfer skilled labour between firms within a free enterprise economy appears to be compromised by insufficient investment in worker training. Perhaps this explains why governments in Canada have been quick to subsidize retraining and skills updating.

At the same time, other factors such as a robust economy can be seen to influence skills training.

> It strikes me that this is a place where linkage to the state of the macroeconomy is important. If you have an unemployment of 7.2%, or a youth unemployment rate of 14%, which is the current unemployment rate for people under 25 in Canada, you have to ask yourself, as an employer, "Why would I train?" ... What you observe in tight labour markets is quite the

> contrary. In the United States today, when you have unemployment rates of 1% in some of these urban ghettos, employers are out there saying come on, we'll train you; we'll put a bus down there, bring you to work, give you the training, and then we'll give you a $16-an-hour job. Why is that happening? It's not because of the altruism of business; it's because that's the only way they can get workers. [Michael McCracken, 8:10:15]

New industry institutions are emerging to cope with some of these problems.

> There's no guarantee any more that people are going to stay in their jobs. There's increased turnover. There's an expectation that people are going to move around in their job careers, both within their sector and across the sector. One of the approaches that has been developed is to take a sector approach in terms of training. That provides generic training overall in an industry, without worrying about specific proprietary concerns of individual companies, but while providing some of those very basic skills that are required. As the skill levels are ratcheted up, the levels are increasing and the sector councils can ensure that there's a certain level of standard that's constantly maintained within the industry. It's an approach that is gaining some popularity. [Arlene Wortsman, Canadian Labour Market and Labour Productivity Centre, 6:16:15]

The Committee would further suggest that corporations might want to consider a change in how they reward workers, focusing less on fixed salaries and wages, which are based on a worker's input of time, and more on bonuses (in cash or in stock options) based on work performance outcomes, such as productivity and/or profitability. This might also help them to retain some of the important human capital and make skills retraining and updating mutually beneficial. However, the Committee was warned that Canada's capital gains tax is a source of disadvantage to Canadian corporations that would provide stock options as part of their pay schemes to key knowledge workers.

> [H]ow do you change from a replication economy to an innovation-driven economy? You have to change your tax structure, the corporate tax structure. … I'm a firm believer that the capital gains tax on investment in real innovation businesses should be removed. … Our incentive structures are fundamentally wrong and our governing instruments have not really picked up that challenge. … [I]f you're going to have a geopolitical entity called Canada in a knowledge-based world, you have to learn how to create national cluster capability … Because if you can't create national cluster capability, you won't have the manpower base to drive a new knowledge-based economy. [Fraser Mustard, 22:9:35]

The Committee agrees with the central thrust of this opinion, but subsequent to making this comment *Budget 2000* announced that the government will lower the inclusion rate of capital gains subject to taxation from three-quarters to two-thirds and will postpone the taxation of gains on shares acquired under qualifying stock options to when shares are sold, rather than when the options are exercised. The Committee, however, believes there is still more room to move on the capital gains tax rate and we will address the issue in more detail in Chapter 9.

The knowledge-based economy is clearly demanding more and better skills; it is also demanding that skills continue to be acquired throughout a working career.

> It used to be that when you finished high school, university or whatever, that was all the education you were going to get over the rest of your life. What's happened is that

> there has been an increased recognition that education is a lifetime learning operation. [Don Daly 6:16:15]

The Committee, therefore, recommends:

18. That the Government of Canada actively pursue the integration of lifelong learning as a cooperative venture of labour, industry and government to assure the continued growth of the skill, ability and knowledge of Canadians for and in the workplace.

These challenges demand a creative response from government and the public, given the apparently insufficient private capital available to finance lifelong learning. While the Committee is satisfied with the federal government's amendments to provisions of the Registered Retirement Savings Plan (RRSP), introduced in last year's budget, that make it possible for individuals to set aside savings for this purpose, something more can still be done.

The Committee believes that it is essential that the government promote lifelong learning through some sort of new educational savings vehicle. Benefits that go directly to the individual and which allows him or her to shop around for the best private or public training and education would probably be better suited to today's knowledge-based economy than government supplied training programs. The Committee recommends:

19. That the Government of Canada assess the merits of establishing a lifelong learning education savings plan that would permit individuals and/or their employers to contribute, on a tax-free basis, towards work skills training and education.

Brain Drain

Combining knowledge in the workplace is probably the most contentious of the three challenges. This is because "brain drain" is the most obvious way to lose precious human capital. Witnesses provided the Committee with a few salient facts on this topic. The first was: "the evidence to date is that brain drain from Canada is relatively limited and concentrated in a few sectors, and that we are large net recipients of skilled workers from the rest of the world" [Jonathan Kesselman, 20:15:45]. The second is: nothing is new; the phenomenon has been here for some time.

> We discovered in migration studies from census data in both countries that interprovincial migration is much more important than migration from states to provinces, that it was 100 times more likely that someone in British Columbia who wasn't from British Columbia was from another province, rather than from a U.S. state of similar size and distance. For the United States however, we found it was although much more likely that someone would have come from another state, that they would have come from a Canadian province, that there was much more migration from Canada to the United States than from the United States to Canada. Indeed that's been true for more than 150 years. [John Helliwell, 20:15:35]

Finally, "brain drain" flows are mostly temporary and, as the trend to globalization continues, it follows trade:

> Quite clearly the intent was as part of NAFTA to make it easier for people to facilitate the expanded trade flows by means of cross border movements, both temporary and longer term. … In a way the statistics that I'm getting from the census and so on show surprisingly small permanent long term moves of people in response to the FTA. It's quite to be expected that there be a lot of temporary flows … [John Helliwell, 20:16:25]

In the Committee's opinion, despite the minuscule statistics supporting a "brain drain," we cannot afford to be complacent. If public moneys are being spent to educate and train Canadians for the workplace, the returns to those public investments must be realized by providing greater domestic employment and wealth creation.

> For our economy to grow rapidly in the high-tech sectors, Canadian business needs not only to retain our home-grown talent, but also to hire critical technical and managerial skills from the U.S. When the firms are forced to pay large salary premiums to compensate for the higher Canadian personal taxes, as they report they do in many cases, Canadian business either bears higher costs that makes it less competitive, or it foregoes those skills in a way that will hobble growth here. [Jonathan Kesselman, 20:15:45]

At first glance, the economic solution to the problem seems simple: introduce a regressive income tax system, where the marginal tax rate would decrease with increasing levels of income. It is claimed that this tax policy would provide the greatest incentive to find work in Canada, would stem the outflow of home-grown talent and attract the best foreign talent from elsewhere. The Committee was advised of an innovative alternative:

> Youth is more important than it's ever been in the global economy. I would take our tax system and completely turn it around to make it the most attractive tax system in the world for young people … we have income tax charged on the basis of the slice of your life that is that year and what that results in is that we have really rich people who are old getting to pay 17% on the first $30,000 of their income. It does nothing for the economy, nothing useful for the economy and they need the money less. Young people who are raising families, bought their first house, deep in debt, are paying off educational debt need the money, the incremental money desperately. Yet we start charging them extremely high rates … early on in their lives if they can get about $60,000 right, which many young 22 year-old engineers start to make. Why don't we change it so that you are taxed on your lifetime taxable income. In the first $500,000 of your lifetime taxable income is taxed at 17%, the next $500,000 is taxed at 26% and the remaining is taxed at 29%. ... That would be revolutionary. [Roger Martin, 22:11:45]

However, both propositions fly in the face of what the Committee believes to be fair and would likely ruin Canada's carefully crafted social cohesion — something that also positively influences productivity. Moreover, most surveys reveal that well-educated Canadians who have emigrated to the United States did so, not for personal taxation reasons, but for better job opportunities. This suggests that the so-called "brain drain" problem is really a symptom of a larger "jobs drain" problem caused by high corporate tax rates relative to the G-7 countries, but particularly the United States. However, *Budget 2000* incorporated a reduction in the general and SME corporate tax rate from 28% to 21% and, to a great extent, this should help to plug both of these drains. The Committee is, therefore, satisfied with these changes and its recommendations for reforming the tax system as laid out in Chapter 9.

Management-Labour Relations and Workplace Rules

The easiest of these three human capital challenges is its integration. The shop floor is already changing from being a place where unskilled and semi-skilled workers engage in repetitive (sometimes mind-numbing) tasks under a command-and-control structure to one where lean and flexible production techniques demand that workers be organized in multidisciplinary teams performing an array of very skilled tasks. This new shop floor will necessitate changes in the industrial relations area, away from the current adversarial, conflict-ridden process to one that is more compatible with innovation, which it will not only accommodate, but welcome.

> We believe the Canadian workplace is the hub of productivity performance, particularly in an economy marked by massive and continuous change and restructuring. It is where national productivity performance ultimately begins. ... Productivity improvements stem not only from the introduction of new technology, but from the way it is applied and the context in which it is applied. Just as important is how work is organized, the skills required to carry it out, and the relationships between management and labour. The relationship between business and labour ... is pivotal to maintaining productivity improvements. [Arlene Wortsman, 6:15:45]

Workplace institutions in the labour relations field will obviously have to adapt. The formation of industry-specific councils to deal with these issues is one such response.

> Any discussion of workplace change and its impact on productivity must be broadly cast. There are in fact a number of industry-specific sector councils that allow the stakeholders to meet together to work out effective solutions that are sector-specific. They can also undertake specific research on issues or address concerns that have industry-wide relevance. This broader casting must also account for local and national climates for industrial relations and our collective ability to resolve industrial conflicts. [Arlene Wortsman, 6:15:50]

Still more will be required.

CHAPTER 9:

MACROECONOMIC CONDITIONS AND TAXATION

The 1990s began with the most severe and protracted recession that Canada had experienced since the Great Depression of the 1930s, followed by probably the most sluggish economic recovery in more than half a century. Despite this poor macroeconomic performance, the usual expansionary fiscal solutions could not be applied; the structural deficit and high debt load at that time necessitated a restrained fiscal policy — a position contrary to the one it had adopted in similar circumstances for more than 50 years. This strategy clearly had a negative impact on investment and employment, but, as was well described by witnesses, it also contributed to Canada's poor productivity in comparison with other G-7 countries. On the positive side, the tight fiscal response by the Government of Canada paid dividends; the balance sheet has improved tremendously and the financial turnaround has opened the door for positive fiscal stimulus. Without any new federal fiscal impulses to the economy, the federal government could be expected to accrue a surplus of more than $100 billion within the next five years. There was no shortage of suggestions from witnesses on how this should be used and, though self-interest was evident in some comments, the bulk of them did address the productivity and competitiveness challenges. In reflecting the consensus that emerged from its hearings, the Committee will be emphasizing these aspects of the debate.

In this chapter, the Committee will first broach Canada's macroeconomic conditions and how to ensure that the recent gains from prudent fiscal management do not go by the wayside in an era of forecasted budget surpluses. Indeed, we insist that sensible management of the federal budget must not disappear along with the deficit. Given the Government of Canada's well-stated goal of a 50-50 split between increased expenditures and tax cuts/debt retirement, the Committee will next focus on the most contentious issue of our hearings, taxation; our discussion will begin with the tax structure before moving on to corporate, personal and capital gains taxes.

Macroeconomic Conditions

Macroeconomic conditions are generally understood to be "favourable" when there is no output gap (i.e. when aggregate demand equals aggregate production capacity) and output is growing at its potential. In the absence of these favourable conditions, productivity is affected through three principal channels: employment, scale economies, and investment in physical capital. In Chapter 5, we saw how depressed aggregate demand in the 1990s contributed directly to about 4% of our total productivity gap with the United States. The average Canadian family was said to have lost about $240 per year solely through the employment conduit to productivity. There was no estimate of how much was lost through foregone economies of scale and under-investment in M&E. To some extent, these effects were briefly touched on in Chapter 6 dealing with the drivers of productivity.

Since the second half of the 1990s, there has been a substantial economic turnaround in Canada and the country's economic outlook has never looked brighter. The national unemployment rate, now at 6.8%, is at its lowest for a quarter of a century, inflation and interest rates are as low as they have been in our history and we have a declining debt-to-GDP ratio. In fact, with the exception of the government's debt load, Canada's macroeconomic fundamentals are comparable to those experienced in the 1960s, the so-called "golden years" of economic growth. "The good news … is that Canada's recent strong record on monetary and fiscal policy means a better climate for investment and for productivity gains than was the case in the earlier decade" [Peter Drake, 22:9:10].

Canada's low unemployment rate appears to be lower than the traditional non-accelerating inflation rate of unemployment (NAIRU), suggesting that we have reached our aggregate production capacity and will soon experience inflation. While a cautionary monetary policy is advisable, there may be a lesson to be learned from the United States, given that that country is much further ahead of Canada in the expansionary phase of the 1990s business cycle. American productivity has been undergoing a renaissance and growing at unprecedented rates in recent years; this has coincided with the longest period in American history when there has been recovery without igniting inflation. To date, therefore, the U.S. has not needed a tight monetary policy response. The business sector in Canada has made similar structural adjustments to that of the United States — mostly by adopting lean and flexible production methods; thus, expected higher productivity growth rates may afford less, rather than more, restrictive fiscal and monetary policies.

In trying to choose a correct macroeconomic path for stabilization, witnesses were overwhelmingly in favour of tax cuts. Paying down debt and increasing government expenditures beyond what was deemed absolutely necessary did not even hit the proverbial "radar screen." The stereotypical recommendation was:

> At 61%, the debt-to-GDP ratio still remains very high. It must be reduced to at least 50% in a reasonable period of time before the government considers any significant program spending initiatives beyond what is necessary to maintain our social programs and cover off the pressures resulting from inflation and population growth. [Michael Murphy, Canadian Chamber of Commerce, 10:9:10]

Nor did witnesses put much faith in the hope that debt reduction would lead to a resurgence in productivity:

> I think there are lots of good public policy reasons to pay down the debt, but I don't think productivity is one of them. … whatever one may think about the virtues of paying down the debt, intergenerational equity and so forth, I do not think they're rooted in — at least at the debt levels that we're at — productivity concerns. [Richard Harris, 20:16:20].

About the only benefit to Canadian productivity from paying down the government's debt would come indirectly through savings and investment:

> The issue of debt pay-down certainly could be a constructive element in an overall program of improving competitiveness and productivity. … [I]f the government retires debt or retires additional public debt that means there is less drain on domestic savings going into the public sector and therefore domestic savings are more available for investment in Canadian industry. [Jonathan Kesselman, 20:16:20]

Yet other witnesses suggested that tax cuts would be far more effective in stimulating private savings and investment: "I put the focus of tax cuts versus paying down the debt ... we have an historic opportunity in this $90 billion surplus, to change the fundamental incentive structure for working, saving and investing" [Roger Martin, 22:11:20].

Moreover, tax cuts were also seen to be a higher priority than increased government expenditures for reinvigorating productivity. "The key to increased productivity is increased adaptation, innovation, most effectively encouraged by tax reduction ... We need tax reductions much more than we need new or expanded government programs or subsidies" [Dale Orr, 10:9:25]. However, some measure of caution in fiscal management is needed:

> We think that the federal and provincial governments must lower tax rates to enhance Canada's tax competitiveness especially on the personal income tax side vis-à-vis the United States. We need to put in place policies that will promote a well educated, well trained workforce and create a more favourable climate for investment. Canadian governments must keep budgets roughly in balance to keep the government debt-to-GDP ratio on a downward track and overall we think that these measures will help boost productivity, certainly a required step in order to raise living standards in Canada over the next decade and improve on the very dismal performance in the last decade. [Peter Drake, 22:9:10]

The Federal Tax Structure

The business and economic community clearly saw tax cuts as the most important stimulus for the economy, productivity and competitiveness. As much as they saw tax cuts as important, however, they felt that restructuring the taxation system was even more so. Virtually all those who commented on taxes claimed that our current tax structure has perverse effects on productivity and competitiveness. As they are structured today, and before *Budget 2000* is fully implemented, government revenues are too reliant on taxes that have large distortionary impacts on the economy. Canada is atypical of the G-7 countries in terms of its tax structure; as one witness put it, "our taxation, ... it's simply out of line for purposes of competitiveness" [Roger Martin, 22:11:05]. More than one witness said that if Canada is going to do only one thing about taxes, this should be to bring our tax structure more in line with our chief trading partner and competitor, the United States.

Productivity experts also claimed that Canada relies too heavily on corporate taxes in its overall tax revenue mix and that our highest marginal personal income tax (PIT) kicks in at a very low income threshhold. Advice to the Committee stressed that, for improved productivity, savings and investment should be stimulated through lower marginal tax rates on capital and businesses.

> The most urgent tax policy needs for enhancing efficiency and growth of the economy are better incentives for savings, investments, entrepreneurship, and innovation. These needs relate more to capital markets than to labour markets. But insofar as they relate to labour markets, it is those for higher-skilled and higher-paid occupations rather than lower-skilled workers. Hence, policy changes should concentrate on sensibly chosen cuts in business taxes and on PIT changes that reduce higher marginal tax rates, particular as they apply to savings and investment. [Jonathan Kesselman 20:15:50]

In terms of PIT, cuts to the marginal rates were frequently recommended. This, it was said, would give us the "biggest bang for our tax buck" since they would affect everyone at the margin, whereas other ways of reducing personal taxes would not.

> [W]hat needs to change is tax cuts that are oriented directly towards the incentives to work, save and invest on the margin. … For example, they may be laudable, from a social policy standpoint, but increasing the child tax credit does nothing for the marginal decision, right, because the marginal dollars get taxed exactly the same. Raising the GST credit, even increasing the threshold of the tax brackets, does very little to change the marginal incentives for Canadians, generally, and is extremely expensive. [Roger Martin, 22:11:20]

In terms of PIT reductions, three priorities were advanced:

> For the PIT the most important changes for productivity include three areas: First, lowering marginal tax rates at upper, middle, and high incomes and sharply raising the income levels at which the highest rates apply through both federal changes and provincial changes such as those recently proposed in Alberta and Saskatchewan. Second, reducing the inclusion rate for taxation of capital gains from 75% to 50%. Third, sharply increasing the access to tax recognized retirement savings. [Jonathan Kesselman, 20:15:55]

Obviously, *Budget 2000* heeded two-and-a-half of three of these last recommendations.

Our third recommendation of this report stressed the need to stimulate savings and investment in physical capital; again, change to the tax structure is the best way to achieve this objective. While the Committee is of the opinion that *Budget 2000* largely responds to the challenge facing Canada, still more restructuring is needed from a productivity perspective. First on the list would be the capital tax.

> The third plank on the tax side is to eliminate capital taxes. We see that the capital taxes serve really no useful purpose, and are in effect a tax on innovation. The forest products sector, as I mentioned, is the most capital-intensive industry. It accounts for about a quarter of all spending in the manufacturing sector on machinery and equipment. As a result, innovation in the forest sector is largely diffused through purchased technology. Thus it's essential that we ensure new investment is forthcoming as this is the key to sustaining growth and jobs in the forest sector. [Steve Stinson, Canadian Pulp and Paper Association, 28:11:00]

With respect to the government's rationale behind a capital tax and its relevance to today, the Committee was told:

> It is probably because capital doesn't move that it's far easier to tax. ... It's manufacturing in particular, the more capital-intensive sectors and the resource processing, an area that is making those investments so easy to collect. That itself is a reflection of a tax system that is probably more focused on the industrial structure that was common up to about 1960 than any new modern industrial structure because industry has changed quite a bit since then. [Jayson Myers, 28:11:25]

The Committee realizes that in an era of globalization, corporations have greater scope to determine where they invest and in which jurisdictions they are likely to earn most corporate income. Moreover, corporations can increasingly "disintegrate" their production processes and shift low value-added production to low-wage jurisdictions and high value-added production to high-skilled labour and low corporate tax jurisdictions.

Corporate Taxation

Canada's corporate tax structure was identified as the weakest link in our entire tax system. It provides the most economic distortions and impedes productivity and innovation throughout the business sector. There are two basic problems with the current structure: (1) there is not a level playing field between sectors; and (2) the tax rates are too high relative to those of our chief competitor country, the United States.

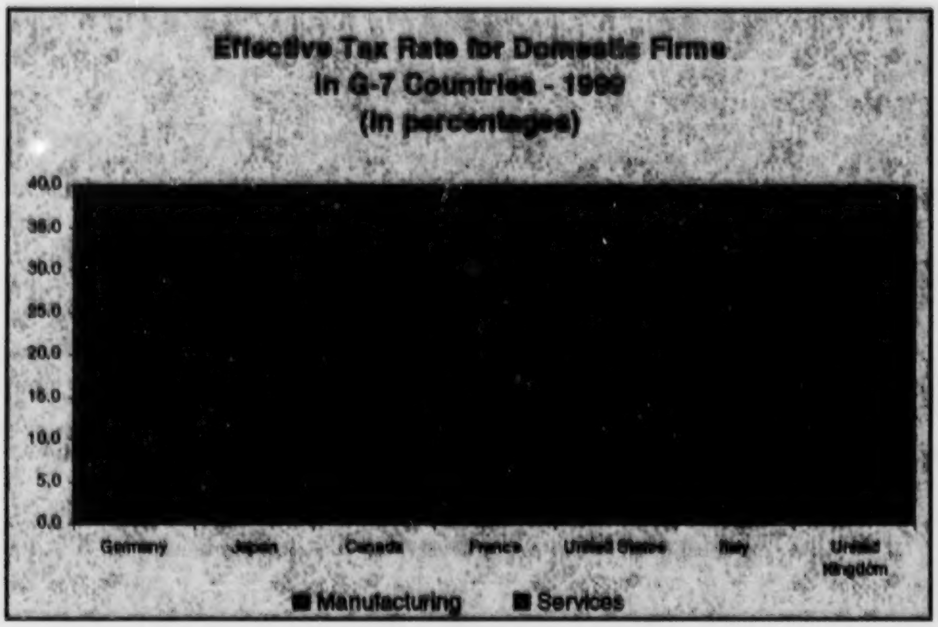
With respect to the unequal playing field, it appears that history explains much. Favourable tax treatments are still accorded to the resource and manufacturing sectors of the economy; they pay a 21% corporate tax rate, whereas others pay 28%. This places additional burdens on the newer, knowledge-based industries outside the manufacturing and processing sector. The Committee was told:

> The structure of our business taxation leads to a great deal of inefficiencies and inequities. ... we did a study on the taxation of capital income, and what we found was that there were certain sectors that were getting astoundingly generous treatment and other sectors getting very poor treatment. What we were doing was steering investment into some sectors and steering it away from other sectors by virtue of the structural aspects of business taxation. So it's not just a matter of reducing corporate taxes as a lump and that will produce magic changes and so on; you really have to look at the structure of business taxation as well as the levels. [David Slater, 10:9:35]

These views are confirmed in Figure 9.1. The difference in the effective tax rate between manufacturing and service sectors is greatest in Canada. This difference, of more than 8 percentage points, compares to France (2.5 percentage points) and the United States (0.2 percentage point). A solution was proposed:

> For the corporate income tax, the most important change is to reduce the basic tax rate on firms outside the currently preferred manufacturing and processing sectors. The highest tax sectors include many of the high tech and other higher growth service sectors. Once the playing field has been levelled, there should be further moves to reduce our corporate tax rate below that of the U.S. The direct and indirect benefits to the Canadian economy, which would flow back to the public sector as higher revenues from all taxes would make this change doubly rewarding. [Jonathan Kesselman, 20:15:50]

Figure 9.1



Source: Mintz, Jack, C.D. Howe Institute, 1999

Again, *Budget 2000* responds to and will largely correct this economic distortion. The reduction of the general corporate tax rate from 28% to 21% will bring more neutrality between the different sectors, particularly providing relief to the newer knowledge-based or high-tech companies.

Figure 9.1 also indicates that of the G-7 countries Canada applies the highest and third-highest effective tax rate on the services and manufacturing sector, respectively. However, Germany and France are proposing to lower their effective tax rates in 2000, leaving Canada as uncontestedly the highest tax jurisdiction in the G-7 countries — that is, before *Budget 2000* is fully implemented. The Committee is, therefore, pleased with the federal budget proposal that will put Canada's corporate tax rate somewhere in the middle of the G-7 countries.

The Committee is also impressed by the budget's proposal to separate out for capital cost allowance (CCA) purposes selective manufacturing and processing equipment that might have an extraordinarily short economic life.

> We were certainly pleased by the provisions in the budget on CCA, that categorize manufacturing equipment as a separate class. I think that gives companies a great more flexibility there. And moving toward a faster rate of depreciation would certainly help. I think across all of industry you have some of the more capital-intensive sectors that have production processes in place, and chemicals would be a good example, pulp and paper would be a good example, primary metals, the life of that equipment is far longer than some of the equipment that is put in place by, for instance, electronic equipment manufacturers, where the rate of obsolescence is somewhere in the range of two years. If you look, though, … not the

> obsolescence rate of the equipment but the rate at which companies themselves are expecting to make money to pay off that equipment, on average, in manufacturing, it's two-and-a-half years. And I think anything that would speed up the rate of write-off to become much more in line with the usage of equipment — would be certainly beneficial and would provide a greater incentive for productive investment. [Jayson Myers, 28:11:20]

In an innovative economy, the economic lives of assets shorten. The Committee, therefore, recommends:

20. That the Government of Canada review and assess its capital cost allowance regulations for manufacturing and processing equipment for the purpose of ensuring that the implied rate of depreciation accurately reflects the useful economic lives of these assets.

Personal Taxation

The business and economic community saw personal taxes as the least problematic of the taxation system. Personal income and payroll taxes were not way out of line with those of other countries; indeed, compared to European countries, Canada's marginal rates were favourable.

> Canada does rely relatively on PIT in its total mix, though no more than the U.S. at about 38% of total revenues and relatively lightly on payroll taxes, or PRT, compared with most countries, including the U.S. However, for workers at low and moderate incomes, the PIT and PRT are both essentially taxes on labour income. So holding PRT rates artificially high — that is, beyond the needs of the Employment Insurance program — in order to finance larger PIT cuts for those at low and moderate incomes is a saw-off. [Jonathan Kesselman, 20:15:50]

It was suggested, however, that the top marginal rate in Canada's personal income taxes begins at a relatively low income threshold.

> Reducing taxes is therefore important from the standpoint of competitiveness. Although Canada's relative tax burden is in line with the OECD average, this is definitely not the case when compared to the United States. The significant tax burden gap between Canada and the U.S. is negatively impacting our competitiveness. ... Comparing marginal tax rates demonstrates the extent of the gap between Canada and the U.S. Canada's top combined marginal tax rate of 52% kicks in at $65,000 while in the U.S., the top rate of 42% is applied to an individual making $275,000 US, about $400,000 CDN. Canada's personal income tax is a proportion of GDP and is 14.6%, the highest level in the G-7. [Michael Murphy, 10:9:10]

Canada's competitive position with the United States is unfavourable only at the top end of the income scale:

> I would say that persons earning right up to average full-time earnings which is somewhere in the $30,000s, Canadian dollars are bearing lower burdens than in the U.S. Now of course low $30,000s is not comfortable middle class, but it's not quite working poor. Of course we hit our highest income tax rates, our highest marginal rates of tax at around $60,000 based on individual earnings in Canada and somewhat higher levels before you hit the federal high

> income surtax in some of the provinces that have high income surtax. So $60,000 to $70,000 would be typically where you start to incur the high rates of tax here. In the U.S. the very highest federal income tax rate is on the order of a couple hundred thousand U.S. dollars based on family income. So it's much higher. [Jonathan Kesselman, 20:16:55]

Nevertheless, the overwhelming advice given to the Committee was to reduce personal taxes in order to boost savings and investment.

> Personal income tax reductions can increase productivity by increasing take-home pay at the margin and by increasing the savings available for investment. Increasing take-home pay increases the incentive to seek work, to work, to train, to become educated for higher paying occupations and to stay in Canada. ... Reductions in EI premiums ... increase the incentive to work as well as the incentive to hire. [Dale Orr, 10:9:25]

The Committee feels that, given the present economic conditions, *Budget 2000* responds adequately to the situation. However, should the buoyancy of the economy continue, the financial position will provide ample scope to reduce personal taxes even further. The Committee, therefore, recommends:

21. That the Government of Canada, in the event of good fiscal fundamentals over the next few years, dramatically raise personal income tax brackets, as well as the basic personal exemption.

Capital Gains Taxation

A surprising amount of criticism was levelled at Canada's capital gains tax. This tax applies both to people and corporations; the rate is close to 40% for individuals in the highest tax bracket, whereas it is now 20% in the United States. Furthermore, the highest U.S. tax bracket starts at a much higher level of income than Canada's; a 10% capital gains tax applies to most individuals in the United States. The chief criticism of the Canadian capital gains tax is that it impedes people from investing in high-risk ventures, particularly knowledge-based companies.

> So, how do you change from a replication economy to an innovation-driven economy? You have to change your tax structure, the corporate tax structure. And I'm a firm believer that the capital gains tax on investment in real innovation businesses should be removed, whereas the capital gains on making money playing with money — what I call fiscal roulette — should be increased. Our incentive structures are fundamentally wrong and our governing instruments have not really picked up that challenge. [Fraser Mustard, 22:9:30]

The second criticism of Canada's system is that when a capital gain is offered by an employer to an employee as part of his or her remuneration, it is triggered by the exercise of the option, not upon the sale of the stock as it is in the United States. Our capital gains tax, therefore, appears at odds with a move to a knowledge-based economy. Small knowledge-intensive firms in Canada are at a substantial disadvantage to those in the United States when trying to retain key personnel.

The Committee tends to agree with these criticisms. We believe, however, that the reduction in capital gains taxes to come from having two-thirds, rather than three-quarters, of the capital gain subject to tax and the deferral of tax to employee stock options until the sale of the stock, as planned in *Budget 2000*, will mostly remedy this problem.

It was further suggested, citing the recent American experience with tax rate changes, that a cut in the capital gains tax rate would not cost the federal treasury much:

> I personally believe in terms of incentives, capital gains should be cut the first and the most and I think it would have the lowest cost to the treasury. … Looking at the U.S. experience there's basically no relation between capital gains tax rates and revenues. The one case where there was, was 1986 just before the capital gains tax rate was increased. All kinds of people cashed out just ahead of that and there was a huge inflow of capital gains just before that rate went up. After that there has really been no relationship between the capital gains tax rate and the amount of money that the U.S. government or treasury has taken in as share of GDP. Our case is that lowering capital gains can actually lead to increased revenues on the capital gains tax. [Douglas Porter, 22:11:40]

The Committee believes that Canada can still do better on the capital gains tax front, the best approach being to match the U.S. capital gains tax rate. The Committee, therefore, recommends:

22. That the Government of Canada reduce capital gains taxes by further lowering, to one-half, the inclusion rate of capital gains subject to tax.

CHAPTER 10:

ECO-EFFICIENCY AND THE KNOWLEDGE ECONOMY

The Economy-Environment Nexus

The environment is the life support system of human kind and other species. It functions as a resource supplier, waste assimilator and direct source of aesthetic value, carrying out these functions in what can be conveniently called a closed economic system in which everything is an input into everything else. According to the first law of thermodynamics, we cannot create or destroy energy; it can only be converted or dissipated into some other form. Thus, all natural resource exploitation ultimately leads to some form of waste that ends up or remains in the environment until assimilated. When we find the appropriate balance between the harvesting and natural regeneration of our renewable resources, when we are able to expand our renewable resource base to match the decline in exhaustible resource stocks, and keep the consequent waste flows within the assimilative capacity of the environment, we have achieved "sustainable development." With a growing population in an already crowded world, the principle of sustainable development further relies on technological progress to raise the efficiency of our natural resource use to balance any positive scale effects arising from more consumption. Under these conditions, the natural state of the environment can be maintained indefinitely for future generations.

Identifying and describing sustainable development is one thing, achieving it is quite another. For instance, market systems achieve an efficient allocation of resources, man-made or environmental, when the prices of all resources reflect their scarcity values, including the costs related to the right to use the environment, our common life support system. Put another way, the pollution costs of economic activities must be factored into the pricing of resources; otherwise there would be little incentive to economize and curb our polluting practices.

Since economic activity first began, but particularly since the Industrial Revolution, human beings have been able to exploit most natural resources on a grand scale without paying directly for the life support functions of the environment. We have been able to do so because the environment is, in most situations, common property and free for the taking. The world's economy has, therefore, benefited from an "environmental subsidy." The result has been the over-exploitation of natural resources and often leading to excessive air, water and solid waste pollution, the breakdown of existing ecological systems, the destruction of wildlife habitat, and species extinction. Left unchecked, the natural environment will be degraded, possibly in some locations to a point beyond repair or restoration in our own lifetimes or those of many future generations.

Governments of all political stripes have, therefore, stepped in to supplement private sector decision making in a variety of ways in order to achieve a better environmental outcome. Such ways include command-and-control instruments (e.g. mandatory pollution abatement technologies, regulated effluent discharge rates, toxic substances disposal rules, and direct funding of recycling programs) and market-based instruments (e.g. transferable pollution permit or quota systems, effluent or emissions charges, deposit-refund systems, and tax-cum-subsidies). On the international front, governments have committed their countries to improving the environment through several recently signed multilateral environmental agreements, such as the Montreal Protocol and the Kyoto Agreement. Thus, to protect the environment, human health and all life forms, governments have intervened in the marketplace and substituted their value judgments of resource scarcities for those of the private sector, with varying degrees of allocative success.

The nexus between the economy and the environment is unquestionably complex — ignorance abounds. About all that can be said with some measure of confidence is that organisms, human included, are not only the result of, but also the causes of, their environmental habitats and their changes. From an economic perspective, without accurate cost estimates of the environmental damage inflicted by our behaviour, especially our industrial activities, and without more certainty about their linkages, there is always the possibility of market failure (e.g. the Bhopal chemical plant and *Exxon Valdez* oil tanker fiascos) and government failure (e.g. the Canadian eastcoast cod fishery collapse; the wasteful tropical deforestation resulting from poorly designed and unenforceable land/property rights in the Brazilian Amazon). Getting and maintaining a firm handle on economic-ecological interaction has become a perennial social concern, and the lack of knowledge has made it hard to identify the institutions that best preserve the environment and its assimilative capacity.

The Static Economic-Environmental Tradeoff Paradigm

Starting in the 1950s, government attempts to include the external costs of pollution in the management decision making of private corporations took the form of command-and-control regulations. Subsequently, from the late-1980s, governments have experimented, in very limited circumstances, with market-based instruments for controlling pollution. The economy-environment tradeoff from command-and-control regulations is often very costly; gains for the environment can be achieved only at great economic cost. Market-based instruments, on the other hand, have desirable characteristics that lessen this tradeoff: (1) these instruments need not be applied site- or industry-specific to achieve a national or global objective; (2) the market-ecological information required to achieve a given economic-environmental balance may be less burdensome; and (3) the incentive structure of the instruments may lead polluters to go beyond the specific targets of the regulator. Consequently, least-cost pollution abatement can be encouraged when using market-based approaches.

> [B]usiness leaders in Canada still expect command and control regulations from government, and they're waiting for government to tell them what environmental requirements must be met. Although Canada is nominally moving away from command and control type regulations, the reality is that progress is very slow and business has been burned in the past because early action voluntary initiatives have not been recognized when government has subsequently introduced mandatory requirements. To a large extent this has occurred at the provincial level, but few business leaders differentiate between being burned by federal or provincial environmental regulations. [Colin Isaacs, 22:9:50]

Regardless of the regulatory approach, the parties negotiating the inclusion of environmental costs into economic decision making are engaged in a kind of wrestling match. Gains on the environmental front are achieved at the expense of a less vibrant economy, because their added expenses erode industry's competitiveness. The tradeoff between the two social objectives is regarded as fixed because the parties perceive products, processes and technologies also as being fixed. Hard fought *social benefits* come, therefore, only with onerous *private costs*, particularly for the country that leads on the environmental agenda. Consequently, international agreements are often a political necessity in order to alleviate domestic fears of a loss of relative competitiveness in products (mainly commodities) sold in world markets. These agreements, some commentators have argued, may not be worth the paper they are written on, given the vast divergence in the interests of signatories (e.g. industrialized versus non-industrialized countries; natural resource exporting countries versus importing countries), and their legal unenforceability.

The "green consumerism" movement and ISO-13000 eco-labelling initiatives forge a complementarity between the economic and environmental objectives of society where they clearly never existed before. Environmental objectives pursued by government regulation are another matter, however. Viewed in the confrontational light described above, environmental objectives are substitutes for economic objectives and they will be resisted whenever and wherever they are advanced. In spite of much lip service, substantive headway on the environment will be slow at best.

The Dynamic Economic-Environmental Complementarity Paradigm

As we move from an industrial to a knowledge-based economy, it can be increasingly observed that the most internationally competitive firms in the world are not those characterized by low input costs or the largest scale of production, but those that are the most productive and innovative. Moreover, these highly productive and innovative firms often thrive on the world stage, even though they may be more environmentally regulated than their less productive competitors. This has led some economic researchers to question the theory of the static economic-environmental tradeoff.

In the total quality management (TQM) move of the 1980s, the attempt to eliminate product defects showed that many production processes and material handling systems were inefficient and wasteful. Managers attempting to iron out their production wrinkles were surprised that their innovative responses led not only to better quality products, but also often to lower costs. Contrary to preconceived perceptions that superior products were more expensive to produce, they often turned out to be less so. If TQM taught us one thing, it is that product defects signal inefficient product designs or production processes and that innovations to overcome defects can sometimes bring forth productivity gains and enhance competitiveness.

Similarly, some corporate managers have come to realize that pollution results from incomplete use of materials and resources and thus is also a sign of inefficient product design or production processes. Could it be that environmental regulation spurring innovation intended to abate pollution can inadvertently increase firm productivity and competitiveness? In a dynamic world, there is a possibility that competitiveness through innovation cannot only break this static tradeoff mentioned above, but could possibly forge a complementarity between economic and environmental objectives in much the same way as "green consumerism." Under these conditions, improvements in the environment could happen relatively quickly.

While all the economic evidence is not in yet, there are hopeful signs all around us. For one thing, the NAFTA may not have brought all the economic prosperity that was promised by economists, but it has certainly not promoted the flight of companies from Canada and the United States to escape environmental regulation, as was predicted by nationalists. Indeed, one of Canada's manufacturer associations is promoting greater environmental awareness and responsiveness:

> We run three programs to encourage ISO certification ... So we're quite active in the field. Today however, especially with questions around energy efficiency, climate change, we're encouraging companies not only to look at ISO 9000 but also ISO 13000 and the environmental certification too which is going to be quite important. [Jayson Myers, 28:11:50]

The National Round Table on the Environment and the Economy reports the same cooperation:

> We've been doing work on eco-efficiency which basically, together with industry, means we've been developing standardized measures by which industry can report on how efficient it is being with the use of energy and material. This is a very important concept. Industry is very interested in it and it has great implications for Canada. [Stuart Smith, National Round Table on the Environment and the Economy, 22:9:10]

Consequently, Canada's environmental industry is also flourishing:

> The environment industry in Canada today consists of over 5,000 companies with annual sales in excess of $19 billion, or 2.2% of Canada's GDP. Canada's environment sector employs about 220,000 people, making it the third largest employment sector in Canada, following pulp and paper, and the chemical industry. It's a knowledge and technology-based industry. Fifty percent of workers in the environment industry have a university degree or college diploma. Environmental companies are located in every region of the country and exports exceed $1 billion. [Colin Isaacs, 22:9:40]

An example of such innovation, and in fact an argument for less government ownership of industry, comes from the energy field itself:

> There's a movement now toward small-scale distributed energy generation. ... Now the reason for this is that you now have new materials from which you can make new, efficient micro-turbines, or even small, not necessary micro, mini-turbines, and as a consequence of that, you can set up your energy generation, mostly using natural gas, but you can set up your energy generation and avoid wasting the heat, because now it's small enough that you can make use of the heat locally. You can also avoid the need for transmission lines and all the losses that occur, plus all the materials that are required. [Stuart Smith, 22:9:15]

But institutional innovation is also taking place:

> Another example, ... manufacturers are increasingly being required to take life cycle responsibility for what it is they produce. And they're saying to themselves, well, if I'm stuck

> taking the responsibility for this thing from cradle to grave, maybe I ought to hang onto this. … So they're beginning to understand that they're not really selling the product, they're selling the service that that product brings. Consequently, they're starting to re-organize the way they do business. [Stuart Smith, 22:9:15]

Specific examples of institutional change that are leading to both economic and environmental benefits are:

> Xerox figures that if they're going to take responsibility for their machines from cradle to grave, they won't even sell them to you in some instances. They won't even lease them to you. It's their machine. They'll provide you documents. That's what you really want is documents. And so the Xerox company has learned, since they've got control of these machines anyway and are stuck with them anyway, they now have an incentive to re-use all the parts they possibly can. So they design their new machines to use as many of the old parts as possible, refurbish the old parts, keep recycling them over and over again, net result they have to buy much less in the way of material. But they're providing a document service now as opposed to selling you a machine. [Stuart Smith, 22:9:20]

And

> Dow Chemical with Safety-Kleen used to sell you tons of solvents that you could degrease your machines with. … Dow Chemical and Safety-Kleen are proposing and offering people is a degreasing service. They'll come in, they'll do the degreasing for you. They'll take responsibility for the solvents. They'll take them away with them at the end of the day. So what's their incentive? They make more money the less solvent they use because now they're offering you a service. They get paid per unit degreased. They use their expertise in degreasing. They know exactly the right amount of solvent. You don't have to train all your employees about the safety aspect of each solvent. … They take the responsibility to deal with the environment. You don't have worry about inspectors bothering you. So it's a great service for you and it saves you money and Dow makes more money by selling the expertise of their people than they do by selling solvent. [Stuart Smith, 22:9:20]

Institutional Management of Economic and Environmental Challenges

These positive developments were not entirely the result of regulation, but of the cooperation and volunteerism that can be combined with profit seeking. While this anecdotal evidence is encouraging, it would clearly be incorrect to assume that all environmental measures enhance industrial productivity.

> While the last decade has shown us that incentives and economic tools may be more effective than regulations in achieving enhanced environmental performance the core of … [the] message is that environmental performance leads to higher economic performance and that Canada's record in this area is mixed and is still valid. [Colin Isaacs, 22:9:40]

Careful attention to the choice and design of these instruments is, therefore, advisable.

> The environmental challenge, I think, is to raise productivity gains, raise living standards, but that can also help Canada meet its environmental challenges. After all, productivity gains are essentially about doing more with less. Not all productivity gains are necessarily helpful to the environment but if the economic backdrop is encouraging to productivity gains, it will be much easier, I think, to promote the specific productivity gains that will be helpful to an improved environment. [Peter Drake, 22:9:10]

The implications for country's productivity were described to the Committee:

> GDP and energy used to go together. The last five years, they've separated. GDP is continuing to go up, energy has sort of flattened out … There is less dependence on energy, and for that matter, I will argue, less dependence on material as well, and we'll see some reason to believe that. [Stuart Smith, 22:9:15]

And

> What you see happening is that, in the old days, return on investment and labour productivity pretty well went together, because mostly what you were doing was substituting new machines for old people. Therefore the two figures tended to go together, but not now. There are companies now … that are substituting people and new technology, people and new knowledge for materials, and so the labour productivity number may not look that terrific, but the total factor productivity number and the amount of money they're making looks a whole lot better. [Stuart Smith, 22:9:15]

If this is correct, it would provide a second reason, in addition to Canada's poor investment performance, for why we have observed a decrease in the productivity growth rates for labour relative to the growth rates for total or multi-factor productivity since 1973 (see Chapter 1).[39]

The Committee was pleased to see that *Budget 2000* recognized the value of seeking innovative solutions to environmental problems by allocating $700 million to this area over the next 4 years. However, the Committee feels that the government can make greater strides on the environmental front while enhancing the productivity and competitiveness of Canadian industry through greater reliance on the promotion of eco-efficient initiatives. Eco-efficiency is an important business practice and management tool, whereby innovations in technology, production processes, product design and business organization and practices can lead to lower unit costs, improved product quality, lower environmental-related liability, less material usage and less adverse impact on the environment. The previous section provided some notable examples of eco-efficient practices and innovations, but the World Business Council on Sustainable Development defines it more broadly to include: reducing the material intensity of goods and services; reducing the energy intensity of goods and services;

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[39] One cannot be certain of this conclusion since the multifactor productivity calculation does not include an estimate of the natural resource stock. A comparison of the multifactor productivity with and without such an estimate would be useful and more conclusive.

reducing the dispersion of toxic materials; enhancing recyclable materials; maximizing the use of renewable resources; extending the durability of products; and increasing the service intensity of goods and services.

The Committee, therefore, recommends:

23. That the Government of Canada place greater emphasis on encouraging the adoption of eco-efficient management techniques by industry through: (1) promoting environmental management systems, including ISO 14001 standards throughout the supply chain of major economic sectors; (2) improving environmental labelling and consumer information; (3) encouraging the development and diffusion of eco-efficient technologies and products through the use of programs that support research and development and commercialization; and (4) promoting education and awareness of eco-efficient measures such as benchmarking products and production processes for their eco-efficiency, as well as providing such analysis for small and medium-sized businesses.

PART III:

PRODUCTIVITY AND COMPETITIVENESS OF SELECTIVE AGRICULTURAL AND INDUSTRIAL SECTORS

CHAPTER 11: The Agriculture and the Agri-Food and Beverage Processing Sectors

CHAPTER 12: The Forest Products Sector

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CHAPTER 11:

THE AGRICULTURE AND THE AGRI-FOOD AND BEVERAGE PROCESSING SECTORS

Economic Contribution and Industry Structure

The agri-food sector shipped $72.8 billion worth of goods and services in 1998, representing more than 8.4% of the country's GDP, while beverage processors shipped products worth an additional $7.5 billion. Primary agriculture shipments accounted for approximately $28.5 billion, representing 3.2% of Canada's GDP. The food and beverages processing sector (retail, wholesale and food service industries) accounted for about $52 billion, or 6.0% of GDP.

The food (excluding fish) and beverage (alcoholic and non-alcoholic) processing sector comprises about 3,000 establishments, employs about 230,000 people, is Canada's third largest manufacturing sector, and supplies about 80% of total food and beverage consumption in the country. The sector is very fragmented and is dominated by 67 large firms with sales exceeding $100 million, representing 60% of total shipments made by the sector. Cooperatives operating primarily in the dairy and poultry subsectors account for about 20% of the value of shipments.

In 1998, Canadian exports of agri-food commodities were valued at $22.6 billion and imports were valued at $16.4 billion, resulting in a positive trade balance of $6.2 billion.

Productivity and Competitiveness

Technical change in farm production has continued at a pace of about 1% per annum over the past 4 decades, leading to declining long-term prices for most agricultural commodities, discounted for inflation. At the same time, there is also a trend to larger farms both in Canada and the United States, with Canada following the United States æ although this lag is getting shorter all the time. For example, the 1996 census reported that there were 276,548 farms in Canada, representing a decrease of 18.3% since 1976. In contrast, the amount of cultivated land has remained relatively stable over the period; the result being that Canadian farms are, on average, 22% larger today than they were 20 years ago. In fact, the average farm size was about 608 acres (422 hectares) in 1996, up from 499 acres in 1976. As a consequence of these structural changes within the sector, each Canadian farm now produces enough food for 120 people, a 300% productivity gain since the 1950s.

The overwhelming majority (98%) of farms are family-operated businesses, but their legal structure is changing, as 37% of farms in 1996 were registered as partnerships or family corporations. Larger farms (based on gross farm receipts) represent an increasing share of all farms. The number of large farms (greater than $100,000 in gross farm receipts) increased by 11% between 1991 and 1996, while the number of smaller farms (under $50,000 in gross farm receipts) declined by 6%. The result is that large farms now represent 30% of total farms, compared to 15% in 1981; small farms represent 55% of total farms, compared to 68% in 1981. Using the latest data, more than half of an average farm operator's income (estimated at $53,435 in 1995) now comes from off-farm sources, though this situation varies significantly by type of farming operation and region.

Farm incomes fluctuate from year to year for a number of reasons, including variable weather patterns, input costs and world commodity prices; thus, off-farm income is used to provide financial stability in carrying some farm operations. In general, input costs rose more than commodity prices in the 1990s, resulting in a decline in incomes and, at 3% before tax, farmers' return on investment is 2 to three 3 lower than that of the other agricultural subsectors.[40] One perennial source of depressed financial performance in primary agriculture has been low world commodity prices, in particular for wheat and grain prices, as a result of substantial subsidies provided by governments in Europe and the United States. The extent of the problem is shown in the Producer Support Estimate as a share of the value of production plus the government payments: Canada, 17%; United States, 22%; and the European Union average, 45%.

The surplus production caused in Europe by these subsidies, together with the barriers to market access created by state protectionism (increasingly in the form of environmental or health and safety measures), bring trade policy issues to the fore.

> Market access in terms of non-tariff barriers I think are probably the growing issue and may indeed become the greatest issue and they include everything from health and safety to environmental issues. Certainly they do affect Canadian competitiveness and competitiveness of other countries as well. One of the other workshops we held last week was on the precautionary principle and DU has now bought into the use of precautionary principle in a huge way. [Sally Rutherford, Canadian Federation of Agriculture, 28:9:20]

Beyond the surplus production created by these subsidies, agricultural production has a few peculiar economic conditions shared by few other sectors of the economy (perhaps, the oil and gas sector). Most farmland has a low opportunity cost, meaning that when agricultural commodity prices plummet it takes a considerable long time before land is taken out of production. Most other industries reduce production within a few months of the building up of inventories, thereby stabilizing the market. In agriculture, however, there is a significant time lapse between the planting and harvesting of the crop; the costs attributable to the former can therefore be characterized as a sunk cost of operation, at least in the immediate growing season. This lack of flexibility on the production side may also extend beyond one season as we witness many farm families also seeking off-farm income support (particularly at a time of reduced government support). Consequently, despite the falling real prices of most farm commodities as reported above, we see the amount of land under cultivation has remained fairly constant; there has been no supply contraction (just bankruptcy and going out of business sales that restructure ownership patterns). Now, given the industry's strong productivity increases on that land over the years, also mentioned above, farm income can decline even to crisis proportions without any corrective or stabilizing actions.

> Such a crisis is upon the farm community in 2000. Prices plummeted in 1997 and have not recovered since. Indeed, the Committee was told that "in the short term, though, I think there still will be some difficulties in the grain sector on the price side for another year or so" [Tim O'Neill, 30:1:10].

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[40] The Canadian Federation of Agriculture, Agriculture in Canada, p. 26.

The downstream industry has also undergone significant restructuring since the early-1990s. The number of food and beverage processing establishments declined from about 3,600 in 1990 to about 3,100 in 1995, but has since increased slightly to about 3,200. Capital investment in the processing sector has averaged about $1.5 billion throughout the 1990s.

Figure 1.5 showed that labour productivity in the Canadian food and beverage processing sector was about 90% of that of the United States. This was a better performance than that of the business sector, whose productivity is about 80% of that of the United States business sector. However, the trend in productivity over the past decade is somewhat mixed:

> The food and beverage processing sector was characterized by disappointing multifactor productivity performance over the 1988-92 period, with a decline in the food sector outweighing a slight increase in the beverage sector and leading to a decrease overall (0.8%). This occurred despite a noticeable increase in the sector's capital to labour ratio over this period of time. Canadian performance contrasted unfavourably with that in the US, where multifactor productivity in the food and kindred products manufacturing sector increased 2.8% over the same period of time. Although varying by sub-period, region and sub-sector, labour productivity in both the food and beverage sectors, measured as the ratio of real GDP per person hour worked, did show increases over the 1988-95 period, of 14.2% and 42.4% for food and beverages, respectively.[41]

As already noted above, Canada has a favourable R&D tax credit system and the private and public infrastructure necessary to support R&D for the sector. Despite these advantages, Statistics Canada reports that R&D expenditures by Canadian food companies, at about $71 million in 1995, represented about only 0.2% of the value of food shipments. On the other hand, the Wall Street Journal reports that U.S. food companies devote 0.6% to 1.0% of their sales to R&D.

Industry Outlook and Policy Issues

Canadian farmers, more than most others, are dependent on the international market and, therefore, bear more risks. For this reason, Canada has a long tradition of providing price and income stabilization programs to assist farmers, probably beginning with the Crownest pricing policy at the turn of the last century.

Both recent federal and provincial government cutbacks and international trade constraints have adversely affected the incomes of farmers. Indeed, farmers have seen a 50% drop in government support from $2.8 billion in 1993 to $1.4 billion in 1998. The repeal of the Western Grain Transportation Act, which had replaced the Crow, for example, had the effect of increasing transportation costs to farmers by $550 million annually. Furthermore, federal cost recovery initiatives have increased existing fees and added new fees for the services federal departments provide. A study released by Agriculture and Agri-Food Canada last year showed that in a four 4 period, from 1994-95 to 1997-98, cost recovery fees affecting the agri-food sector increased 28%, from $109 million to $139 million. Another $5 million in costs has been shifted to farmers through the transfer of services from government to the private sector.

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[41] Agriculture Canada, *The Canadian Food and Beverage Processing Sector – Adapting to a Global Market*, p. 5.

This Committee feels that, given the elimination of the federal deficit, it is time now for the government to reinvest in agriculture. The Committee recommends:

24. That the Government of Canada consult with agricultural stakeholders on building an enhanced agriculture and agri-food policy that would provide price and income support for the farming community to allow for continuous productivity improvements.

The prospects of the downstream industry are much more favourable. Indeed, there are good prospects for growth in the food and beverage processing sector, but food processors will have to build on their strengths and adjust to a changing competitive environment that includes market trends to globalization, changing consumer demand and technology changes. Greater trade liberalization will continue as the world economy becomes increasingly integrated. Globalization has already influenced the industry's structure significantly and Canadian firms have been slow to shift their focus from domestic to international markets.

A key feature of the food and beverage processing sector is the growing importance of large multinational enterprises (MNEs) whose advantages include brand name recognition, economies of scale in production, buying power, access to high quality R&D facilities and worldwide distribution systems. MNEs already produce about 40% of the sector's output and, as a result of the growing integration of the North American market, their Canadian branch plants are now producing fewer corporate product lines for the domestic market. Essentially, by restructuring in order to win corporate "product mandates" for the North American market, the companies can achieve economies of scale not possible when they are restricted to the small Canadian market.

Despite the trend to globalization, there will always be distinctive regional and local niche markets, such as hotels and restaurants that demand specialized high quality and value-added products that will allow SME participation in the industry. Moreover, MNEs sometimes prefer to have some of their brand name products manufactured by smaller firms ("co-packing"); for example, for flexible short production runs that must meet local packaging requirements or formulation adjustments to suit local tastes and preferences. SMEs are also manufacturing "private label" products for large retail grocery chains, thereby shifting costly brand name development downstream.

CHAPTER 12:

THE FOREST PRODUCTS SECTOR

Economic Contribution and Industry Structure

The Canadian forest products manufacturing industry comprises the paper and allied products, wood and building products industries. Based on a vast renewable resource, the Canadian forest products industry has a significant social and economic impact on the well-being of Canada. It accounts for 11% of Canada's manufacturing GDP and makes significant contributions to manufacturing in all regions of the country. As the largest rural employer, it also plays a crucial economic role in rural communities; more than 337 communities in Canada are economically dependent on forest industry activities. There are over 3,550 establishments in the sector, providing jobs to over 800,000 workers. While forest product firms are among some of Canada's largest corporations, much of the industry is dominated by SMEs.

The Canadian forest industry is unique among mature industries in Canada in that its shipments have continued to grow, reaching an annual average growth rate of 5.7% for the 1990-97 period. As an export-focused industry, it contributes $35 billion to the country's trade balance, more than any other manufacturing sector. Forest products shipments reached $64 billion in 1999, with exports valued at $44 billion and accounting for 69% of production. With 18% of world exports, Canada is the world's largest forest products exporter, with its major established markets being the United States and Japan. In 1999, exports to these countries were valued at $35 billion (79%) and $2.9 billion (7%), respectively. A number of new exporters (i.e. Brazil, Indonesia and Malaysia) have begun to make significant inroads into world markets. While the United States will remain a key market for Canadian producers, the fast-growing populations and per capita incomes of Latin American and Pacific Rim countries mean that they will become important as markets for Canada.

Productivity and Competitiveness

Forest commodities are mostly produced in world-scale operations located close to the resource, while higher value-added products are manufactured in SMEs that are usually located near or in urban centres. Obviously, either type of operation in Canada is based on the country's vast, renewable forest resources that provide the basis for any competitive advantage Canadian forestry companies might possess. This advantage over competitors, however, is shrinking, as the industry must increasingly rely on more distant stands, which are often of lower quality and more costly to access. In comparison, some foreign competitors are successfully harvesting wood fibre from managed plantations at lower cost than Canadian companies.

The relative prices of inputs, such as wood fibre, energy, labour and transportation, are key determinants of competitiveness in the forest sector. Traditionally, abundant and cheap wood and energy provide a competitive advantage for the Canadian forestry operations, but in recent years these costs have increased significantly. Higher stumpage fees and electricity costs are the main culprits. At the same time, Canadian mills have been denied the ability to achieve major savings through cogeneration (producing their own electricity and selling any surplus to power utilities), unlike their American competitors.

Structural changes are taking place in the industry, with movement toward large and more focused companies, greater integration of wood and pulp and paper operations, and efforts to increase value-added production. These strategic moves have, in part, allowed U.S. firms to realize a much higher pre-tax return on investment than Canadian firms. In recent years, there has been domestic mergers and acquisitions (e.g. the merger of Abitibi-Consolidated and Donohue), foreign takeovers (e.g. Weyerhaeuser buying MacMillan Bloedel, Smurfit-Stone buying St. Laurent Paperboard) and purchases of U.S. assets by Canadian companies (e.g. Canfor's purchase of Northwood from Mead Corp.).

In the past, Canada's production and exports consisted mostly of commodities subject to cyclical demand and prices. In the 1990s, the industry moved the production emphasis to extracting more value from the resource base. For example, Canadian mills began to increase their production of coated paper and to upgrade from newsprint to higher grade printing and writing papers. On the wood products side, plywood production has remained stable while Canadian capacity for oriented strand board, medium density fibreboard and engineered wood products is now being expanded.

In order to maintain its position as a global leader, the Canadian forest products industry invests upwards of $2-5 billion annually in capital expenditures. While aggregate capital expenditure levels remain very high, the nature of investment patterns within the industry has been changing over time. During the 1990s, North American timber supply constraints restrained capacity expansion. Much of the new investment in the industry is being directed toward plant modernization and conversion to allow the manufacture of higher value products. Future shifts in production emphasis are expected to foster considerable economic growth and job creation potential, reduce cyclicality and provide an increased return from the forest resource.

The labour productivity of Canadian wood and paper workers is among the highest in the manufacturing sector. Although Canadian productivity has been higher than the United States for the past decade, the gap has been closing. Furthermore, the introduction of new technologies over the last 10 years has changed the skill sets of employees and forest industry workers now include more of those in biotechnology, chemistry, wood engineering and other specialized fields. However, R&D expenditures in the forest sector, at about 0.3% of sales, are relatively low compared to Canada's major competitors, which average between 0.8% and 1.1%.

The adoption of new information technologies is fairly advanced in the larger world-class companies making paper or lumber, but remains slow in the SMEs that make up the building products and paper converting companies. The large companies, all users of electronic data interchange technology, are implementing resource planning solutions to improve production efficiencies and are shifting to Web-based purchasing and sales in an effort to catch up with American competitors. A number of Internet portals and hubs enable electronic sales and purchasing of equipment and supplies. In Canada, Quebec has created an Internet virtual marketplace to facilitate sales and reduce inventories of wood chips. British Columbia has introduced Web technology to facilitate timber stumpage payments from forest companies.

Industry Outlook and Policy Issues

The Canadian forest industry's future is favourable. With the advent of new information and communications technologies and e-commerce, world demand is growing:

> I'd like to make the point that, contrary to the popular perception of forest products as a sunset industry, we see global demand for pulp and paper and other forest products continuing to grow in line with overall economic growth in the global economy. With the advent of Internet technology and its various business applications there have been a lot of doom and gloom predictions as we saw with the computer and fax machines. In fact, the Internet has turned out to be complementary to the demand for paper rather than a substitute. ... Most of the dot.com companies are using full-page ads to direct people to their websites. E-commerce, there's more packing used when products are delivered individually to customers. So it's definitely a positive for the industry at the moment. [Fiona Cook, Canadian Pulp and Paper Association, 28:10:55]

Canada's industry, which is poised to fill this new demand, believes that more favourable Canadian policies could contribute to its ability to respond to the challenge of new global competitors.

> [I]f Canada were to maintain its traditional share, we would need to see our capacity from its current state at a level of 30 millions tonnes to 40 million tonnes. While we don't believe growth of that extent is likely, we do believe that, despite the low rates of return and the inroads made by competitors in other countries, Canada should be able to capture some of this future growth. To do so, some fundamental changes need to occur in the direction of Canadian economic policy. [Fiona Cook, 28:10:55]

Historically, Canada has enjoyed a comparative advantage in forest products due to its substantial natural forest endowment; however, this is diminishing as high quality fibre and easily accessible stands are becoming scarcer. Lower cost fibre from global competitors will continue to put pressure on Canada's competitive position. There are relatively few areas where commercial forests are not already allocated for harvesting and, except through re-allocation from one forest company to another, new forest land with resources that are considered commercial cannot be obtained. This, combined with the low value of the Canadian dollar, is what is driving the many takeovers of Canadian firms by U.S. corporations.

Sustainable forestry practices and certification are affecting market access and customer preferences. Under provincial regulations, companies are required to follow costly sustainable forestry practices and many are also becoming certified under the Canadian Standards Association Sustainable Forest Management Standard, Forest Stewardship Council or ISO 14001. With more domestic and international environmental regulations being imposed or undertaken voluntarily to deal with a variety of toxins, air pollution and climate change issues, the Canadian forest industry will find that a greater share of capital expenditures is required for environmental needs.

Trade barriers also impede growth. For example, the Softwood Lumber Agreement with the U.S., which expires March 31, 2001, has reduced the exports and profitability of lumber producers and, in turn, lowered the forestry sector's ability to re-invest and enhance its productivity. The Committee also recognizes that since this agreement was implemented, all of Canada's provinces have raised stumpage and other fees to the sector and have eliminated any implied subsidy in these charges. The Softwood Lumber Agreement has clearly outlived any useful purpose it could have possibly served. The Committee, therefore, recommends:

25. That the Government of Canada take the position that there be no renegotiation of the Softwood Lumber Agreement with the United States at the expiry of the existing agreement.

Canada's efforts to achieve accelerated tariff reductions on forest products in a new WTO round of negotiations were dealt a serious blow by the failure of the Seattle Trade Ministerial, in part because of the suspicions of environmental non-governmental organization with respect to what they characterized as a WTO Logging Agreement. Technical barriers to trade are also being created to replace the import duties that have been reduced in recent years.

> Despite the globalization of markets Canadian pulp and paper producers still face tariff barriers in the EU and those markets with the most potential for future growth being Asia and Latin America. In fact, close to 10 million tonnes or one-third of Canada's production is still destined for areas where tariffs remain an issue. We estimate that on average tariffs add an estimated cost of $20 per tonne to Asian shipments and $50 per tonne to Latin American shipments, effectively, in fact to the industry's entire profit margin. This is a conservative estimate as well, because it doesn't include the opportunity cost, i.e., those sales that have not been made because of those tariffs. [Fiona Cook, 28:10:55]

Continued R&D in the forest industry will be crucial to the future of the sector. In recent years, declining funds for the three major forest industry research institutes (PAPRICAN, FERIC and Forintek), primarily derived from membership fees, have affected the ability of the industries to innovate. Following several years of financial losses, the Canadian industry was profitable in 1999. Future investments in new technologies and processes will depend on continued profitability.

> I think what we need to do is to move away from replicating existing technologies and what others are doing, and try to create some sort of sustainable advantage through new investment in new technologies. I think the way to do this is to take a look at the incentives we have presently in place. We suggest that by restructuring these incentives, we could do a lot to encourage new investment. We suggest accelerated depreciation rates or to look at investment tax credits. I think the point of this is to recognize that such investment not only plays a critical part in terms of our competitiveness but it also plays a very important part in supporting development of our technology industries. [Steve Stinson, 28:11:00]

The Committee agrees with these views and has addressed them in recommendation 20.

The Canadian Pulp and Paper Association, as a representative of a very capital-intensive industry, also calls for the elimination of all capital taxes, which stifle innovation in the Canadian forest products sector and lead to the importation of foreign technologies.

> The third plank on the tax side is to eliminate capital taxes. We see that the capital taxes serve really no useful purpose, and are in effect a tax on innovation. The forest products sector, as I mentioned, is the most capital-intensive industry. It accounts for about a quarter of all

> spending in the manufacturing sector on machinery and equipment. As a result, innovation in the forest sector is largely diffused through purchased technology. Thus it's essential that we ensure new investment is forthcoming, as this is the key to sustaining growth and jobs in the forest sector. [Steve Stinson, 28:11:00]

Again, the Committee agrees with these views.

CHAPTER 13:

THE MINERAL AND METAL PRODUCTS SECTOR

Economic Contribution and Industry Structure

Canada has a well-established mining industry that contributes significantly, both directly and indirectly, to the economy. Mineral production was valued at $26.5 billion in 1998, or 3.8% of the country's GDP. Canadian mineral and metal companies further exported roughly 80% of their production, amounting to $45.2 billion and representing 14% of total domestic exports in 1997.[42] The Mining Association of Canada described the industry's economic impact to the Committee as follows:

> We employ 367,000 people, 1 out of every 40 working Canadians. Strong productivity growth has enabled the minerals and metals sector share of employment to remain relatively constant over the past two decades, with some adjustment between decreases at the mining end of the business and increases at the value-added end of the business. Mining jobs rank amongst the top-10 highest industrial paying jobs in Canada … For every billion dollars output created by the mining, smelting and refining sectors, direct demand for goods and services increases by $615 million in the Canadian economy. That $1 billion ... it doesn't matter whether that $1 billion is additional in Canadian operations in Chile, or Peru, or in northern Ontario. More than 600 domestic consulting services and equipment companies earn in excess of 30% of their revenues and 50% of that through export to the Canadian industry by supplying Canadian mining companies. [Gordon Peeling, 23:17:00]

Productivity and Competitiveness

All too often, the natural resource sector, and mining in particular, has been portrayed as being of diminishing importance, part of the so-called "old economy." The productivity data, however, suggest that the Canadian minerals and metals sector is a "sunrise," rather than a "sunset," industry. As the Committee was told:

> Productivity gains in Canada's resource sector, and mining in particular, were generally strong over the past two decades. The average Canadian annual rate of total factor productivity growth grew by 3% in the mining sector over the period 1984-98, almost double the 1.7%

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[42] The valuation of exports exceeds that of production because Stage III semifabricated products, comprising inputs other than mineral products, are included in the mineral and metal exports figure, but not in the production figure. The four processing stages in the minerals and metals industry are defined as:

Stage I: primary mineral production (mining and concentrating);
Stage II: metal production (smelting and refining, including iron and steel);
Stage III: minerals and metals based semifabrication; and
Stage IV: metal fabrication.

In 1998, Stage I accounted for 28.8%; Stage II – 16.0%; Stage III – 23.0%; and Stage IV – 32.2%, of the total mineral industry contribution to GDP.

> growth in the manufacturing sector, and triple Canada's total economy productivity of 0.95%, … which shows you the average annual total factor productivity growth, which includes returns on capital, labour, etc. So this is a multifactor approach, and you can see that even as you break down mining — quarries, primary metals, non-metallic, etc. — that they all exceed the total economy average. … According to a recent report by the Centre for the Study of Living Standards, mining, primary metals and quarries represented 3 of the top-10 leading industries in average annual total factor productivity growth in Canada over the period 1984-98. [Gordon Peeling, 23:17:00]

This strong growth in productivity was the result of substantial investments in both physical and human capital. The ratio of gross fixed capital formation to value added in the minerals and metals sector was 50% greater than that in the manufacturing sector over the past decade. In terms of human capital, the industry's highly educated, trained and skilled workforce is made up of technicians and technologists (33%), holders of a bachelor degree (29%), of a masters degree (12%), of a Ph.D. (14%) and other R&D staff (12%). Furthermore, firms with training budgets had planned expenditures of $1.2 million in 1999 and all companies believe that, over the next 5 years, they will require more R&D staff, especially Ph.D.s, technicians and technologists.

In terms of productivity levels, the Committee was told that:

> The 1998 mining quarries were amongst the top ten industrial contributors to the gross domestic product per hour of work in Canada creating in constant 1992 dollars more than double the Canadian average of $26. There are the numbers … quarries at $64.68, and mining at $52.80 are more than double that general Canadian average. So wealth creation per worker in the minerals and metal sector has made a significant contribution to raising the standard of living for urban and rural Canadians, and making Canada one of the wealthiest nations in the world. In this case just to define wealth for you it's simply an asset that provides … or yields a flow of income. [Gordon Peeling, 23:17:05]

Canada's vast territory and good geological assets provide plenty of opportunities for the mining industry to contribute more to the economy than is sometimes recognized:

> The Canadian challenge in terms of being competitive ... first of all we have good geology and although we have been looking for diamonds for a 100 years in this country and a lot of people said no you're never going to find them, the conditions are not right. You create the right conditions, the right stimulus, the right dedication on the science side and we're going to be one of the world's most significant diamond players in the very near future with unlimited potential for growth. Voisey's Bay tells that you can walk over a piece of land in this country a lot of times and miss something obvious. [Gordon Peeling, 23:17:05]

Canada does not necessarily possess a competitive advantage in terms of its grades of ore, however and, because of intense international competition that makes Canadian mining companies price takers on world markets, must continue to invest in R&D, new equipment and mining methods to keep up with its competition.

> In the past five years alone, this commitment has resulted in important technological advances in mine automation, software technology, continuous and remote mining technology, computer automated process controls just to name a few. [T]his R&D effort on process

> ensures that we will continue to derive a significant flow of benefits from the development of our mineral resources into the future. So today's mining bears little resemblance to the practices of the last century or even the last decade in many instances. Intense competitive forces have driven industrial modernization, stimulated innovative activity and resulted in considerable productivity gains in the mining industry throughout the eighties and nineties and why is that? I believe it's because the Canadian mining industry has recognized that unique cost-reducing technologies, processes and products were required to extract low grade, complex and deeper ore deposits. ... We don't necessarily have a factor advantage in our resource base. We have a lot of ground to look at but in terms of our ore grades we're not as well off as some of our competitors so we have to adopt technology faster and develop technology faster than they do. [Gordon Peeling, 23:17:10]

Investment in computer technologies, R&D and exploration is thus critical to the future of the Canadian minerals and metals industry.

> In fact the Canadian primary metals industry invested alone $1.3 billion in computer equipment over the last six years. … We have a very large uptake of the latest developments in software, computer technology applied to process systems etc. The investment doesn't stop at computers. Canadian mining companies continue to invest in R&D … In 1998 the minerals and metal sector invested approximately $363 million on R&D, with an additional $15 million expended on research into services related to the mining industry. … There's another $600 million spent on exploration in 1998, $820 million in 1997, which is a different form of investment in the future. [Gordon Peeling, 23:17:05]

Industry Outlook and Policy Issues

With globalization, offshore opportunities have never been better and mining companies go where the opportunities are best. Healthy levels of exploration are required to replace existing domestic reserves, but many mining MNEs are finding Canada less attractive than foreign jurisdictions. By 1998, a significant number of major Canadian mining companies had shifted their exploration spending outside Canada and Canadian-based MNEs now control approximately one-third of planned spending on exploration around the world, up from 22% in 1992.

Canada's fiscal regime is of primary importance for attracting investment, particularly when we face the increasing challenge of international tax competitiveness resulting from globalization. With 80% of our mineral production destined for the export market, the country must address the issue of a competitive taxation system. The fiscal treatment of Canada's minerals and metals industry must take into account the industry's need to realize a return on investment that adequately reflects the risks taken, capital invested, and the long lead times between exploration and production.

The industry also mentioned the need to pursue multilateral freer trade beyond North America. Tariff and non-tariff barriers remain significant, despite Uruguay Round advances made on the GATT.

> We still have certain tariff barriers that are significant. For example, we were totally unsuccessful as a country in the last round to have any reduction whatsoever in a 6% aluminum tariff into Europe and a 6% tariff on a metal basis is ridiculous in today's terms. We have not seen the removal entirely in Japan, obviously we've achieved the benefits of the free trade agreement with the United States and NAFTA now to bring in Mexico in terms of

> a ten year horizon, so in some ways, our most significant market is secure but we market to over 100 countries and we're competing with everybody in those markets. It's important that the rest of those tariff barriers come down but we're also seeing that governments and other competitors are very adept at non-tariff barriers as well. [Gordon Peeling, 23:17:15]

It would not be a great stretch to say that Canada's future as a world mining leader is at risk unless significant new reserves are discovered and developed. The mining community has indicated to the government that it believes that there should be more clarity in the definition of the Canadian Exploration Expenses (CEE) for flow-through shares, to address specific issues such as the maximum eligible size of a bulk sample, and the classification of certain expenses that could also be treated as CEE or depreciable assets. Adjusting the CEE definition would provide additional clarity and easier compliance with tax policy principles, while encouraging exploration by the mining industry.

Mineral exploration will ultimately determine the future of the Canadian mining industry and the depletion of reserves is the driving force behind such exploration. Exploration, like R&D, requires healthy levels of investment to create and ensure success. Moreover, without adequate levels of exploration to replace existing reserves subject to depletion, the mining industry would cease to exist, resulting in a significant decline in jobs and economic growth of Canada's national and regional economies. The Committee, therefore, recommends:

26. That the Government of Canada consult with the Mining Association of Canada, the Prospectors and Development Association of Canada and the Canadian mining industry to clarify the definition of the Canadian Exploration Expenses and make flow-through share investments more attractive for potential investors.

CHAPTER 14:

THE OIL AND GAS SECTOR

Economic Contribution and Industry Structure

Canada's oil and natural gas industry has two main components, the "upstream," or producing sector, and the "downstream," or refining and marketing sector. The upstream sector includes more than 700 exploration and production companies as well as hundreds of associated businesses such as seismic and drilling contractors, service rig operators, engineering firms and various scientific, technical, industrial, construction, service and supply companies. The downstream sector consists of service stations, petroleum wholesalers, refineries, petrochemical companies, natural gas distribution utilities and pipeline systems.

The upstream crude oil and natural gas industry is a key driver of Canada's economy (particularly Alberta's) and producing $35 billion of oil and natural gas. The Canadian Association of Petroleum Producers (CAPP) spoke of its members' many activities and other contributions to the economy:

> Our industry comprises, or ... CAPP comprises about 175 separate companies, most of which are located in Alberta but operate across Canada and indeed throughout the world. Our organization alone produces about 95% of Canada's oil and natural gas. Last year this industry drilled about 10,500 wells; that is in fact low for the last two or three years. We're expecting some 15,000 well bores this year. ... Direct taxes paid to federal and provincial governments was about $2.5 billion. Associated royalties and municipal taxes would bring that number closer to $6 billion or $7 billion. [William Friley, Canadian Association of Petroleum Producers, 23:16:30]

Canada's oil and natural gas industry is an export-driven, high-tech generator of innovation, jobs and economic activity. It directly employed about 83,000 people in 1997 and an additional 130,000 jobs (indirect employment) provided goods and services for the industry. Including the downstream sector, the total industry has about 447,000 employees. Moreover, the technical expertise required for many industry jobs makes the oil and gas industry the highest paying in Canada, with average wages more than twice the national average. In addition, the highly educated and skilled workers in the industry generate technological innovations that are exported around the world.

Canada produces more crude oil and natural gas than it requires for domestic use; thus, surplus supplies are exported, primarily to markets in the United States. Crude oil and natural gas exports surplus contributed $12.8 billion to Canada's merchandise trade surplus in 1998.

Productivity and Competitiveness

Industry officials and experts generally consider the upstream oil and gas business to be all about technology. The starting point is the crude oil itself; in its natural state, this is a mixture of hydrogen and carbon molecules, which is normally "sweet" but can be "sour" if it contains significant amounts of sulphur. Sweet oils attract a premium price since they are less costly to refine when there is no sulphur to be removed. The weight and density of the crude can vary appreciably from heavy and thick bitumen to light and thin. Heavy crude is slow moving and needs more complicated extraction procedures, while the lighter crude flows more easily to the surface. Reserves of the lighter or conventional oil are declining in Canada so that the development of the heavy crude oil industry is of increasing importance. In view of the changing nature of the resource base, an industry representative commented on Canada's technology achievements:

> Technology is the basis of this industry … and technology is what drives everything that we do on a day-to-day basis. We are innovators in terms of the technology … and of course in order to be as cost-efficient as we can possibly be, we have to develop new technologies continually. In fact, … at that time, the early 1970s, we had no idea how we'd ever get crude oil and natural gas off the East Coast and actually into the markets. Obviously we're going to be producing both natural gas and crude oil off the East Coast in significant volumes, and obviously that is a tremendous success story from a technological standpoint. We're seeing rapid expansion in the Far North, and again that has an awful lot to do with technology, the ability to operate in those climates and get that crude oil to market. … Again, oil sands were not profitable 25 years ago or 20 years ago. It was difficult in that pricing environment. We have some $20 billion of new capital to be invested in oil sands projects over the next five to six years. [William Friley, 23:16:30-16:35]

No matter how you measure it, the oil and gas industry is very capital-intensive. The source of this capital was explained to the Committee:

> The number of wells drilled in Canada every year is really a function of available capital. Available capital comes from two sources, it has traditionally over the last 15 years come two-thirds from revenues generated from the sale of oil and gas and one-third, give or take, year-to-year it changes, but one-third from new capital invested in our industry. [William Friley, 23:16:45-16:50]

Capital also needs to be raised for exploration and R&D; in 1998, the industry spent almost $16.5 billion on exploration, development and field equipment and reinvested close to 150% of its cash flow. In cooperation with government, it has also set up the Environmental Research Advisory Council (ERAC), which is the research organization responsible for R&D on crude oil and natural gas production issues in Western Canada. Since 1992, ERAC sponsors contributed more than $6 million to R&D and more than 50 reports have been published, detailing the results of studies on air emissions, waste management, the clean up of groundwater and soil, and the impact of the upstream petroleum industry's operations on the environment. This collaborative effort has produced cost-effective research results that have directly led to better environmental practices in the industry and have also assisted federal and provincial governments develop sound environmental policies and regulations based on scientific evidence.

Finally, referring to Figure 1.5, the Canadian oil and gas industry is a very productive sector of the Canadian economy and is about 75% more productive than its U.S. counterpart.

Industry Outlook and Policy Issues

Canada's upstream natural gas and crude oil industry is healthy and well positioned to address today's challenges. Canadian producers are able to develop and expand new market opportunities because of Canada's low supply costs and reliable delivery and pipeline capacity. The key to continued growth of the industry is the competitiveness of the Western Canadian Sedimentary Basin. The future opportunities seem to be increasingly in the Far North of the country or offshore:

> North of 60, we have barely tapped that resource and there's some 12 billion barrels of oil, we estimate remaining north of 60. In Alberta, we have produced some two-thirds of our crude, but still there are some 22 billion barrels of oil left to produce in the province of Alberta, close to 7 billion in Saskatchewan, and as you can see off the East Coast, about 5.3 billion barrels remaining of crude to be produced and we have made hardly a dent in that. North of the 60th parallel, 175 TCF of natural gas remaining. You notice in Alberta, only about a third of the natural gas has been produced to date and still some 270 TCF of natural gas left. East Coast, some 75 TCF left and there's a lot of exploration left to do there. So there's a lot of activity left on the natural gas side. [William Friley, 23:16:30]

The upstream industry in Canada is obviously a price-taker on the world market. Global supply and demand, along with the success and failure of key OPEC decision making, drive crude oil and natural gas prices. Canadian industry competitiveness is thus maintained through the cost-effective operations of producing companies and competitive pipeline transportation and government royalty regimes.

A recent concern that is likely to be of increasing importance in the future has to do with land access, something that involves Aboriginal land claims. The industry is pleading for stewardship on the part of government.

> We have a process, and we put an enormous amount of effort into that consultative process with the aboriginal groups involved. But it is continuing to be a source of difficulty for us. We need some federal and provincial guidance, and we need the federal and provincial governments at the table on these issues to help us through this. It's a constantly changing landscape for us. We need long lead times to invest capital, and we need to know what the playing field is, going forward. [William Friley, 23:16:40]

Stable and predictable government regulation is seen as key to the productivity and competitiveness of the industry.

The Committee, as well as the Canadian public, has just witnessed how uncertain and volatile the oil and gas industry can be. For the last 2 to 3 years, the industry has suffered through depressed prices in the vicinity of US$10-12 a barrel and, within the past six months, prices have spiked upward to US$30 a barrel based on OPEC decision making. The industry that had significantly cut back its drilling activity and capital expenditure programs is now reversing its investment position, and its low return on investment by historical standards is once again turning favourable. The Committee clearly recognizes that Canada's oil and gas industry is one of the most productive industries of the country and is in a strong competitive position relative to its U.S. rivals. Government's contribution to competitiveness of the industry must be to provide stability from the supply side. The Committee, therefore, recommends:

27. That the Government of Canada expedite consultation with First Nations regarding resource sharing and management, including land access issues, as well as provide stewardship in resolving outstanding Aboriginal treaty claims in key oil and gas resource areas of the country.

CHAPTER 15:

THE PETROLEUM PRODUCTS SECTOR

Economic Contribution and Industry Structure

The petroleum products industry comprises the "downstream" portion of the petroleum sector and includes 18 oil refineries and 13,000 automotive retail stations. Crude oil (approximately 1.6 million barrels per day) is refined into a variety of different petroleum products, principally motor gasoline, diesel fuel, aviation fuel, light and heavy fuel oil, and other products, such as lubricating oils and greases, asphalt and petrochemical feedstock. The Canadian Petroleum Products Institute (CPPI) described its members' activities and economic impact to the Committee as follows:

> The member companies of CPPI have over $6 billion of capital employed in the business. … We employ directly in the industry 130,000 Canadians ... In addition, we employ indirectly another 100,000 Canadians who supply goods and services to the products business. [Andrew Stephens, Canadian Petroleum Products Institute, 11:15:35]

The three largest refiners (Imperial Oil Limited, Petro-Canada Ltd. and Shell Canada Limited) control about 56% of refining capacity, while the remaining 44% is controlled by 10 regional refiners.[43] Natural Resources Canada estimates that 44% of refinery capacity in this country is Canadian-owned, leaving 56% in foreign ownership, of which the United States accounts for 35% and European companies most of the remaining 21%. Independent businesses own 44% of retail outlets.

Productivity and Competitiveness

Both crude oil and refined petroleum products are produced for an integrated North American market; there is a flourishing cross-border trade in these largely undifferentiated products between Canada and the United States at all levels (i.e. oil and gas producers, refiners, wholesalers, retailers and consumers). By definition, an integrated continental market means that Canadian and American producers are direct competitors. Thus, in the 1990s, both Canadian and American "upstream" and "downstream" industry segments faced market circumstances characterized by little to no growth in demand and both suffered depressed price-cost margins and profitability.

Under current conditions, the industry accepts that refineries must operate at about 85% of crude capacity in order to maintain adequate profitability. Given the relatively flat demand in the 1990s, the industry has had to rationalize its operations from 40 refineries in the early-1980s to 18 in 2000 to achieve this level. Employment was cut even more drastically, so labour productivity in the Canadian petroleum refining industry steadily increased:

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[43] Regional refiners include: Irving Oil, Ultramar Canada Inc., Novacor Chemicals (Canada) Inc., Newfoundland Processing Limited, Suncor Inc., Husky Oil Operations Limited, Chevron Canada Limited, Consumers' Cooperative Refineries Limited, Saskatchewan Asphalt and Parkland Industries Limited.

> Our employees are very productive. For example, our refinery employees generate $200,000 in annual output per employee, which is significantly higher than the average manufacturing employee output of $55,000 per year. Each refinery employee has an employee multiplier of 7 to 1 — that is, each refinery employee creates an additional seven jobs somewhere in the Canadian economy. [Andrew Stephens, 11:15:35]

However, as Figure 1.5 showed, the labour productivity of Canadian refiners is considerably below that of United States refiners.

Oil and gas refining is also a highly capital-intensive industry, requiring $8 of capital for every dollar of output. This far outweighs the average capital intensity of $2.60 of capital for every dollar of output for all manufacturing industries. On these terms, Industry Canada estimated the industry's performance as follows:

> The ratio of capital stock (i.e. value of refinery assets in constant 1986 dollars, which includes machinery, equipment and structures) to refinery daily output represents the industry's capital productivity. Since 1988, capital productivity has averaged approximately $63,500 per cubic metre per day of production.[44]

Beyond the contributions that labour and capital productivity bring to refinery margins and profitability, there are a number of other influences, some of which are beyond the refiner's control.[45] The operating factors are access to low-cost feedstock, the ability of a refinery to process lower-cost heavy sour and non-conventional crude — both of which types are expected over time to become more plentiful and economically attractive — economies of scale, and cost control. In addition, refineries are price takers for both crude purchases and product sales.

The Canadian refining industry is largely based on light, sweet crude oil feedstock, particularly in Ontario, where it has to compete with northern U.S. refineries that have considerable heavy crude coking capabilities that allow them to run the cheaper crude oil. At the same time, industry rationalization has increased the average size of Canadian refineries to a scale that is more competitive with that of northern U.S. plants. Industry Canada sized up the relative capabilities of Canadian and American refineries as follows:

> Canada's industry ahead in hydro cracking and catalytic cracking capabilities, and the American industry ahead in sour crude desulphurization and heavy crude residual upgrading capabilities. The U.S. refiners are therefore currently better positioned to process the heavier, more sour and cheaper crude.
>
> Canadian refiners did not invest in the heavy, sour crude upgrading technology during the

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[44] Industry Canada, *Sector Competitiveness Frameworks: Petroleum Products, Part 1 – Overview and Prospects*, p. 38-39.

[45] Profitability in the petroleum products industry is a function of two margins: (1) the refining margin measures the difference between the refinery's crude costs (i.e. inputs) and the value of the products (i.e. outputs) at the refinery gate; and (2) the retail margin measures the difference between the refinery gate price (usually taken to be the wholesale rack price) and the pump price (net of product taxes) at the service station. The industry's gross margin is the sum of the refining and retail margins and profitability is the gross margin less operating costs, labour costs and income taxes.

> 1980s to the same extent as their American counterparts. The reason is that the differential between Canadian light and heavy crude oil prices was artificially set by the federal government rather than by international market forces. The administered (light/heavy) price differential was less than the open market spread, and too low to justify major facility investments. In contrast, the U.S. government did not administer crude prices, and market forces were therefore allowed to encourage U.S. refiners to invest in more complex refining technology.[46]

This suggests that U.S. refiners have a competitive advantage over Canadian refiners partly because of past government interference in the industry. Industry representatives were, however, satisfied with their more recent performance and present competitive status:

> When we started doing these surveys in 1990, we were in the bottom half of our class looking around the world and in North America. But over the 1990s, through process changes, capital investment, and the use of technology, we have changed our competitive position such that we are now in the top half relative to other players in the world. That's even considering some of the disadvantages of the Canadian climate, including the long population expanse, the fact that our plants aren't world-scale economy, and those sorts of things. I think both of those statistics in terms of supply costs and in terms of external benchmarking demonstrate that the industry is competitive with any other player in the world. [Andrew Stephens, 11:15:40]

In addition to its rationalization initiatives, the industry has invested heavily in computer technologies in order to improve both office and process functions:

> The technology we've been adopting tends to be more information technology as opposed to what I might call mechanical or process technology — information technology in terms of our business systems, the accounting and so forth … Also, … the application of computers to simulate processes and process control — all that has helped us be both more effective in the way we turn crude into products and more efficient in terms of the cost structure. We are starting to see some new technology being developed that we're very interested in. In general, this is technology associated with taking sulphur out of crude oil or taking sulphur out of products. Because there hasn't been a need in the past to do that, there was some fairly typical technology that required high temperatures and high pressures and was very expensive. But we've seen developed, as a result of some of the legislation that's coming at us, lower-cost, low-pressure, low-temperature technologies, which the Canadian industry would like to use. [Andrew Stephens, 11:16:00-16:05]

At the retail or marketing end of the sector, Canada has not rationalized the number of service stations to the same extent as has the United States. According to the industry, through most of the 1990s Canada operated twice the number of service stations per capita as the U.S.; hence, sales volumes per station in Canada were about half (5,300 litres per day) of U.S. volumes (10,000 litres per day in 1994). Along with rationalization (from 24,100 stations in 1980 to 13,000 in 2000), came restructuring. Receiving relatively low retail margins on gasoline sales, Canadian retail operators have had to turn to secondary sources of income, such as convenience stores and car washes, in order to remain viable.

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[46] Industry Canada, op.cit., p. 38-39

> I think in general what we've been seeing over the last 10 or 15 years, as I mentioned earlier, is an increased trend toward efficiency and effectiveness. As you look at retail service station throughputs in Canada, you can see they have been increasing steadily over time. We are still lagging, the average throughputs in Canada relative to the U.S., and I think we'll continue to see a rationalization of facilities going forward. [Andrew Stephens, 11:16:35]

Industry studies suggest that the failure of the Canadian industry to achieve the same efficiency gains through rationalization as the U.S. can be attributed to government. In Canada, the more stringent environmental regulations govern the decommissioning or removal of station fuel tanks mean that it costs more to exit the industry. This leads to excessive numbers of retail outlets in a period of decline and, in turn, to higher pump prices (or is it that the United States is providing an "environmental subsidy" to retailers?).

Industry Outlook and Policy Issues

The industry's future will largely depend on two factors: demand and environmental constraints. Demand has been flat over the past 15 years and forecasts are not much more promising. When environmental concerns are added to this equation, the picture becomes very uncertain. Take, for example, the industry's forecast of the impact of the Kyoto Agreement:

> If a Kyoto type of scenario unfolded, we would see probably a 30% to 35% reduction in demand for fuels that we make in our refineries, whether they're transportation fuels or heating fuels. A 35% reduction means tremendous surplus capacity. It would mean an environment where refiners were unwilling to invest in new technology because there would be no expectation that they would ever get such a return on that investment. [Andrew Stephens, 11:16:15]

On the cost side of the ledger, the most pressing environmental challenge over the next decade is the need to produce more environmentally friendly transportation fuels (i.e. reformulated gasoline and diesel fuels). While the technology for producing reformulated fuels does exist, the investment costs are prohibitive. From society's perspective, the health and environmental benefits must be carefully weighed against these costs to ensure cost effectiveness. Efficiency through the right choice of economic instruments is essential.

There is also the issue of how implementing environmental measures will affect the relative competitiveness of Canada and the United States in an integrated North American market.

> I'll start with the standardized specification question. The example that most comes to mind currently is sulphur in gasoline. Canada currently has a regulation requiring various levels to be met over a certain timeframe. The U.S. is in the process of developing that legislation but does not yet have it in place, and it could be that we will be inconsistent. Another example that comes to mind is southern California, which has a different legislative environment and has more stringent requirements for gasoline than anywhere else in the world. The one place where refining has been profitable over the last several years happens to be California, because there are barriers to entry for product coming in. [Andrew Stephens, 11:16:05]

The Committee, however, wishes to take a more innovative approach to this problem by advocating that Canadian regulations of gasoline characteristics be on the forefront of tough and rigorous environmental standards to provide industry the incentive to innovate and remain ahead of its U.S.-based competitors. In this way, California's tougher environmental regulations will not be a barrier to entry for Canadian gasoline. The Committee recommends:

28. That the Government of Canada ensure that any future environmental regulations imposed on the formulation of petroleum products, particularly gasoline, be at least as rigorous as those of the state of California in terms of both the standards set and the industry's timetable for compliance.

CHAPTER 16:

THE SHIPBUILDING SECTOR

Economic Contribution and Industry Structure

The shipbuilding industry in Canada is generally defined as including establishments engaged in the manufacture and repair of all types of ship of more than five tonnes displacement; activity with lesser vessels is deemed to be boatbuilding. According to this definition, 26 Canadian establishments were engaged in shipbuilding in 1996; there was at least one shipyard in each Maritime province, Quebec, Ontario, Manitoba and British Columbia. There are, however, only a dozen major shipyards in Canada, mostly part of large corporate groups. As of May 1999, there was a workforce of roughly 5,000, with work skills including welding, steel/metal cutting, plumbing, carpentry, electrical work, pipe fitting, as well as numerous other trades required for the construction of a ship.

> The shipbuilding industry in Canada in 1999 comprises employment of approximately 5,000 people and approximately 12 companies. There are four regions where there's activity. In British Columbia, employment is about 1,300. The firms are as listed: Allied Shipbuilders and the Washington Marine Group, which is a fairly significant industrial group. There is one firm remaining in Ontario: Canadian Shipbuilding and Engineering Ltd., in Port Weller, which employs about 700 people. In Quebec, there are two firms, with employment of approximately 1,000: Industries Davie and Verreault Navigation. In Atlantic Canada, there are approximately 1,900 employees in three firms: MM Industra, Friede Goldman Halter, and the Irving Group, which owns a number of smaller shipyards. So we have some major industrial groups in each region, as well as a few small firms still remaining. [John M. Banigan, Industry Canada, 5:9:05]

Shipbuilding in Canada shows virtually every classic sign of being in decline. Industry shipments in 1997, for example, were approximately $608.3 million, which dropped from something more than $1.6 billion in 1990, while value added by the industry fell from $450 million in 1990 to less than $200 million in 1997. In 1990, there were still 48 shipyards (26 in 1996), while industry employment was 11,984 (5,556 in 1996). This downward spiral is not simply the result of an anaemic economy or a protracted recession that began in 1990; the seeds of the industry's demise were sown in 1976, when the shipbuilding industry began to contract in response to a worldwide glut in seaborne shipping and trade services. For example, ship prices are depressed; using a price index of 100 in 1987, prices climbed to 180 in 1992 but have since dropped to 120. The industry has adjusted to these circumstances by: (1) discarding outdated shipyards; (2) contracting out sub-assembly work; (3) shedding labour; and (4) replacing skilled labour with automated machinery where appropriate.

It appears that all segments of the industry have suffered, but in particular tankers and container ships. In Canada, no market has done worse than the export market. Exports accounted for more than 65% of the industry's gross tonnage built in 1976 and 45% of that built in 1979; however, by 1984, exports had ceased altogether. Not until the 1990s did Canada return to the export market, but, even here, the turnaround was slow. Canadian exports of ships were $68.6 million in 1997, representing an export intensity of shipments of 11.3% — its highest level in decades.[47] Coincidentally, this export performance was sufficient for Canada to record its second straight trade surplus in ships of the 1990s.

Productivity and Competitiveness

A shipyard is essentially an assembly plant equipped to handle structural steel units; this involves cutting, forming and fabricating sheet and plate steel and pipe in conformity with ship design specifications. Additionally, some sophisticated shipyards manufacture propulsion machinery. A shipyard requires at least one building berth or dock with a site spacious enough to accommodate the construction of the hull, a quay or jetty deep enough to allow mooring alongside launched vessels, and a good supply of capital equipment. Traditional shipbuilding was concerned with a series of steps incorporating the fabrication and assembly of individual parts piece-by-piece. With the passage of time, this process has given way to another that involves batch production of standardized components. This development enables shipbuilders to substitute automated equipment for skilled labour and to contract out sub-assembly components to firms that may be more competitive.

Despite the decline in demand for shipbuilding in Canada, the industry has increased its capital stock from $700 million in 1988 to $900 million in 1996, representing an average annual compound growth rate of 2.5%. Given the number of layoffs in this period, the capital-to-labour ratio (capital investment divided by salaries and wages) has increased substantially from an average of about 14% in 1990 to 45% in 1996. The value-added component has declined relative to the value of shipments in the 1990s, which illustrates how much some sub-assembly work is contracted out.

There also appear to be some economies of scale at the plant level, but limited on the firm scale, in the form of multi-product line, multi-shipyard ownership, and vertical integration. Indeed, vertical integration between shipbuilding and shipping services is more the exception than the rule. The same is true of multi-shipyard ownership; there has been very little consolidation through joint ownership in this period of retrenchment. In terms of the industry's productivity, the Committee was told that:

> [L]abour productivity in shipyards has increased by 46% since 1991. Real wages increased by only 3%. He can also tell you that the GDP per shipyard worker is $84,000, which is 68% more than the Canadian average in industry. [Les Holloway, Marine Workers Association, 13:10:50]

The Canadian shipbuilding industry is not all things to all people. It does not have the facilities to build the largest categories of ships. As one witness explained:

> It's important when looking at the Canadian shipyard industry to understand that we are not necessarily competing head-to-head with the Japanese and South Koreans. Our competitors are in Norway, in the U.K., in Spain, where they have similar-sized yards, where they have similar types of niches they're going after. This is more where the Canadian shipbuilding industry is. We're not into the VLCCs. We're into ship repair, specialized vessels, conversions, and offshore equipment. If one were to look at those areas, the picture would be different from the one where Canada is less than .04% of the marketplace. [Daniel Primeau, Export Development Corporation, 5:9:55]

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[47] Export intensity is defined as the dollar amount of exports divided by the dollar amount of shipments.

This contrasts sharply with the situation in Japan. As one witness put it:

> The Japanese have been big shipbuilders for a number of years. Their strategy appears to have been to specialize in some of the very large tankers and bulk carriers that has been a niche market for them. It's been an outlet for their steel industry in the post-war period as well. They have come to dominate that particular area. They have become involved in a number of specializations in terms of production technology, like modular construction. They have used information technology for CAD/CAM design and some of these sorts of things and have managed to keep their productivity gains quite high in this particular sector, despite being a fairly high-wage country. So as for the challenge of high wages, I guess it is possible, although obviously rather difficult; if you do use technology and you learn how to specialize, you can be competitive in a niche market despite being a high-wage country. [John M. Banigan, 5:9:45]

Industry Outlook and Policy Issues

The global market is experiencing strong downward pressure, causing the industry to restructure. Reductions in capacity in Japan and Europe have reduced the number of yards from 1,111 in 1976 to 776 in 1996. Industry-led rationalization in Canada reduced employment from approximately 12,000 in the 1980s to 4,711 in 1997. As of February 2000, Canada's share of the international market is small, at 0.03% of the tonnage on order in the world. South Korea and Japan, had 40% and 38% of ship orders by dead-weight tonnage, respectively, with Europe at 10% and the United States at 0.8%.

The Canadian shipbuilding industry is faced with an extremely competitive foreign market, as a result of a significant overcapacity for shipbuilding, a forecasted declining demand, very competitive pricing and new capacity, especially in the Pacific Rim (China, South Korea, Vietnam). Government procurement has declined significantly over the years, as have federal capital expenditures for the departments of National Defence (DND) and Foreign Affairs (DFO) and the Royal Canadian Mounted Police. Budget 2000 will bring some new funding (not yet finalized) to DND and DFO and some of these funds will be used for capital acquisitions.

The Committee was advised that, from a policy perspective, the shipbuilding industry in Canada must be looked at in light of some basic facts:

> In any examination of shipbuilding, one must always be aware of three important premises that have and will continue to have a significant effect on the industry. Firstly, shipbuilders the world over can no longer rely on preferential markets such as those that were once provided by their governments or navies. They must seek external markets. Secondly, few, if any, free market forces are at play in the industry. Shipbuilding has arrived at its present state not by natural market forces but by political manipulation, normally in the form of some form of subsidization. Too often this point is forgotten and discussions of the Canadian industry focus on the role of the market in determining what companies succeed or fail. The market in this industry does not make that determination; governments do. Thirdly, access to competitive financing is a key element in an owner's decision to place an order with a shipbuilder. This is not to denigrate the more traditional factors that determine competitiveness. Suffice it to say

> that one may put together a good technical proposal at an excellent price, but unless the deal is attractively financed, it is unlikely to be consummated. [Peter Cairns, Shipbuilders Association of Canada, 18:9:05]

An immediate example of the unfairness comes from trade policy. Despite there being a free trade agreement between Canada and the United States, there are important non-tariff barriers:

> On the trade side, the government will continue its negotiations in multilateral fora to deal with unfair trade barriers. The most difficult one, of course, is what's frequently referred to as the Jones Act. This is an act that has been on the books in the United States for many decades, which essentially says that all vessels plying a trade between ports in the United States must be built, manned, and repaired by Americans, which precludes Canadians and others from accessing the commercial market in the United States. [John M. Banigan, 5: 9:20]

The Committee understands that a review of a number of issues, including Chapter 11 of the NAFTA, the investor-state dispute settlement measure is being considered by some of the signatory parties and, therefore, recommends:

29. That the Government of Canada seek the repeal of the so-called Jones Act of the United States or seek an amendment to it that would provide an exception for Canadian built, manned or repaired vessels.

Current shipbuilding policy measures in Canada are much appreciated by industry officials, but were viewed as insufficient in light of foreign government intervention in the market:

> I acknowledge that the federal government does give limited assistance to the industry. You are familiar with the 25% tariff on non-NAFTA vessels, the requirement to replace and repair government vessels in Canada, assisted rationalization, accelerated CCA, R&D credits and EDC funding. These are useful measures and important to the industry, but they are not effective in today's competitive market. [Peter Cairns, 18:9:15]

The Committee concurs with these views and believes that the federal government should be prepared to go beyond existing measures in providing strategic assistance to the Canadian shipbuilding industry in its attempt to crack selective foreign niche markets; however, it should not engage itself in a matching subsidy battle with foreign governments. The Committee recommends:

30. That the Government of Canada consult with all stakeholders of the shipbuilding industry to adopt and modify industrial policies that would assist shipbuilders in capturing niche markets.

CHAPTER 17:

THE AUTOMOTIVE SECTOR

Economic Contribution and Industry Structure

The automotive manufacturing sector comprises motor vehicle assemblers and parts and accessories manufacturers; it also includes retailing, vehicle servicing, and other similar service-based functions. Together, these industries make up Canada's largest manufacturing sector, accounting for 13% of manufacturing GDP, 2.2% of GDP, and 25% of Canada's total merchandise exports in 1999.

Canada's automotive sector, consisting of six light-duty vehicle assemblers and over 650 parts establishments, is regionally concentrated throughout southern Ontario and part of Quebec. In 1998, Canada's automotive assembly industry was the sixth largest in the world; from 1990 to 1999, automotive shipments grew 152%, reaching $103.6 billion and manufacturing employment grew 12.7%, reaching 160,000 jobs.

> We had a record production of … almost 2,988,000 light trucks and cars, which was about 18.5% more than 1998 levels and we also had the highest sales volume in Canada since 1988 at 1,501,000 units. Our production in Canada was 19.2% of the total Canada-U.S. production, while our sales were only about 8.8% of the total Canada-U.S. production. [David Adams, Canadian Vehicle Manufacturers Association, 27:9:20]

Canada has had a trade surplus in motor vehicles for the past 31 years. More impressively, this surplus position has improved dramatically in recent years. For the first 11 months of 1999, the automotive industry, including motor vehicles and parts, had a trade surplus of greater than $6 billion.

Productivity and Competitiveness

Canada's automotive assembly industry is very competitive. It produces for North America and competes with the U.S. and Mexico for new North American assembly investment. Since 1983, vehicle production in Canada has increased on average more than twice as fast as that in the United States. While Canada accounts for 16% of North American production of light-duty vehicles, it accounts for only 8% of North American sales. Factors contributing to the strong performance in this sector include competitive wage rates, high productivity, a competitive business environment and favourable economic conditions.

The key competitive factor is, of course, labour costs:

> Several studies cite, including some from Industry Canada in 1998, that the labour costs in Canada are 30% lower than those in the United States, on a common currency basis, and although the lower dollar certainly has helped … So the cost-competitiveness feeds into and encourages investment ... [Bill Murnigham, Canadian Auto Workers Union, 25:9:25]

This labour cost advantage can be broken down into two parts: labour productivity and labour wage rates. In terms of productivity:

> When we're talking about levels of productivity in Canada versus the United States, it's always confused by exchange rates ... But when you examine a range of different assumptions …, what you'll find is that the productivity in Canada … has been 15% higher than the United States in the auto assembly industry. [Bill Murnigham, 25:9:20]

And

> [I]n terms of productivity, Mexico is 60% lower in productivity than in Canada, and though it's gaining fast there's still a long way to go when you look at labour productivity. So that talks about absolute levels, and … studies show that the growth of productivity, the absolute growth from 1992 to 1998 has gone up by 26.5% in Canada, versus 18% in the United States ... [Bill Murnigham, 25:9:20]

This labour productivity advantage results from extensive investment and retooling of Canada's automotive assembly plants that are estimated to have improved Canada's labour productivity in the automotive sector from being 61% of such productivity in the United States in 1986 to being 5% higher by 1998.[48]

In terms of the second part of the competitiveness equation, for the period 1986 to 1996, Canada's motor vehicle industry wage rate at US$36 an hour remained lower than that of the United States at US$55. In 1996, Canada's motor vehicle industry wage rate was US$41, 68% that of the United States.

A key determinant of productivity and competitiveness for the future will be the extent to which the industry continues to outsource non-core activities:

> Under this approach, assemblers focus on their core competencies and outsource other elements to lower cost producers. This leads to the further development of a hierarchy among parts producers: more design, development and systems validation functions are outsourced to Tier One suppliers, and further consolidation is triggered in upstream Tier Two suppliers. The approach also entails joint product development and has led to the creation of successful platform teams.
>
> The evolution of the tier structure will also require Tier Two companies to develop a new set of business relationships. In the past, most parts suppliers dealt directly with the assemblers; however, the changing structure of the industry will necessitate greater linkages with Tier One producers. Tier Two suppliers will also be faced with strong competitive demands, as they are competing almost exclusively on their processing ability. This increases business risk and necessitates a continual focus on more productive manufacturing processes.[49]

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[48] Labour productivity is measured as real gross domestic product per hour and comparisons are based on the 1992 purchasing power parity. Sources: MicroEconomic Policy and Analysis, Industry Canada and Stanford, Jim (2000), A Success Story: Canadian Productivity Performance in Auto Assembly.

[49] Industry Canada, Sector Competitiveness Frameworks: Automotive Industry, Part 1 – Overview and Prospects, p. 55.

Other notable competitiveness developments include:

> One of our members teaming up with United Parcel Service, better known as UPS, to try and take time out of the delivery process that it actually takes getting the vehicle from the factory to the dealership. That time is now currently about 15 days. We're trying to get that down to six days. That will translate or could potentially translate into productivity at the dealer level as well, meaning that they wouldn't have to have as much inventory on hand and building in some better predictability for consumers who are actually going to purchase a car in terms of when that vehicle is going to arrive. They will have the capability to track the vehicle when its shipped on the Internet using the vehicle identification number. [David Adams, 28:9:30]

The auto parts sector, including manufacturers producing parts for both the original equipment and aftermarket sectors, accounted for 1.2% of total GDP in 1998, with annual shipments of $28 billion. The strong growth of this sector, where shipments increased by over 500% from 1980 to 1998, can be attributed to several factors: a strong quality record; favourable exchange rates; investments in leading-edge technologies; and, the emergence of some Canadian-based multinational enterprises as major world players (Magna, Woodbridge, Linamar, etc.).

Industry Outlook and Policy Issues

A good deal of Canada's competitiveness in the automotive sector comes from low wages and a low Canadian dollar vis-à-vis the U.S. dollar, neither of which factors is conducive to prosperity over the longer term. Moreover, the sector, in particular the big three North American companies, has also relied on tariff and non-tariff protection under the Canada-United States Automobile Pact. However, certain aspects of this agreement have recently been struck down by the WTO as a violation of Canada's obligations under the GATT. Thus, the future of this sector increasingly impinges on economic forces outside the policy control of either the sector or Canada.

In particular, Mexico is emerging as a strong competitor for North American automotive manufacturing investment. These attractive investment features are: (1) low-cost production factors (i.e. wages); (2) improving infrastructure; (3) improving quality; (4) improving productivity; (5) potential for strong economic growth; (6) increasing domestic demand for vehicles; and (7) enhanced market access through free trade agreements.

Motor vehicle assemblers are consolidating. For example, Chrysler and Daimler-Benz are now DaimlerChrysler, while Volvo, Jaguar and Mazda are under the Ford umbrella. Consolidation means that there are fewer easily identifiable investors and that plants with underutilized capacity have renewed prospects in the assembler's broader product lines. However, the trend will also bring consolidation in production and therefore make fewer investment pools available. Additionally, we see a "hollowing-out," where decision centres are geographically removed from operations, key decisions are made outside Canada and most R&D is performed at head office.

> New automotive technologies are bound to trigger further structural change. Large-scale commercial implementation of machine vision, multimedia, and intelligent design and manufacturing systems may transform the industry dramatically by the year 2000. Already, these technologies have reduced model development lead times from 5–7 years to 3–4 years.

> It is predicted that product life cycles will be further reduced to 24 months for a facelift and 48 months for a new platform.[50]

Generally, automotive assemblers build where they sell, seeking to position their manufacturing operations in key trading blocks. However, they are increasingly focusing on strategies that will allow them to achieve economies of scale in production on a global basis. At the same time, assemblers are downloading design responsibilities to parts and accessories manufacturers on which they are placing increasingly stringent cost demands. Devolution of design and R&D will provide greater incentive for the parts sector to improve in the shift from parts makers to systems integrators. Currently, the Canadian parts assembly base would have difficulty in meeting this challenge, given that little design and R&D is conducted in Canada. Canada's automotive expenditure on R&D is 25 times less than that in the United States and 4 times less than that of the Canadian manufacturing sector as a whole.

The resolution of the Scientific Research and Experimental Development tax issue is, therefore, an important policy issue for the Canadian automotive sector:

> Regarding scientific research and experimental design, I think although Canada has a very good R&D tax credit system, in recent years there have been issues around project definition as well as the certainty of actually receiving the credit. In the Canadian industry as a whole and in particular the auto industry, we've been working with Revenue Canada and the government in general to ensure that we have the best program in the world. In the globalized industry, the R&D quickly becomes diffused through a company regardless of where it's undertaken and I think that's probably why traditionally we haven't seen a lot of automotive R&D actually take place in Canada … For us to attract R&D projects we have to have the tax credit system that's not only comparable to other countries … but it needs to be much better than that in order to draw the research and development away from the home jurisdiction. [David Adams, 28:9:30]

The Committee agrees with these comments and recognizes that Canadian automobile companies have research mandates in selective niche areas, such as alternative fuels, fuel cells, aluminum castings and engine design. The Committee believes that Canada's success as an automobile builder must be further leveraged to include such R&D. The Committee, therefore, recommends:

31. That the Government of Canada provide incentives to gain a greater percentage of the automobile research and development activity for Canada.

A key knowledge-intensive sector such as the automotive industry faces a major challenge in developing, attracting and retaining highly skilled workers. In the assembly sector, and in the larger parts companies, the labour shortages are in the design and R&D activities, and are impending in a range of production-related specialties. Large numbers of skilled trades and production specialists will be needed to replace those likely to retire over the next two to seven years.

In the smaller parts companies, the challenge is to maintain and raise the level of technological sophistication and design capability so as to ensure a continuing flow of supply contracts from the larger assembly and parts companies. For small and medium-size parts companies, such tools as long training or apprenticeship programs are not appropriate responses since companies do not often have the necessary resources to develop and execute a special training tool or program on their own.

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[50] Ibid., p. 36

Parts and accessories suppliers are increasingly pressured to develop electronic data integration (EDI) capabilities. According to *Canada's Connectedness in Manufacturing* survey reports that 87% of companies in the automotive sector have collaborated electronically (80% across all sectors). The potential inability of Canadian parts suppliers to operate costly and difficult EDI links would seriously impede the productivity of the industry.

CHAPTER 18:

THE AEROSPACE SECTOR

Economic Contribution and Industry Structure

The Canadian aerospace industry is primarily engaged in manufacturing and service businesses related to aircraft, aircraft systems and components (e.g. engines), as well as spacecraft, avionics and other aerospace-related electronics. The aerospace sector also includes the production of ground-based infrastructure to support the operations of aircraft and spacecraft, including satellite ground stations, flight simulators and training, maintenance, repair and overhaul, and air traffic control systems. Canada also has a limited defence industry whose products and services range from armoured personnel carriers to command-and-control communication systems.

There are approximately 700 aerospace and defence companies in Canada, employing more than 80,000 Canadians, many of whom are well paid. Industry revenues were $16.5 billion in 1998 and are expected to have exceeded $18 billion in 1999. More than 80% of this production is for civilian/commercial products and more than 70% is exported. This industry is also among the most research-intensive sectors of the Canadian economy; spending over $1 billion a year in R&D, it is a significant component of the knowledge-based economy.

Canada is a world leader in several high-growth system and subsystem areas of the industry. Of particular note are: Bombardier, a leader in regional aircraft; Bell Helicopter Textron in commercial helicopters; Pratt & Whitney Canada in small gas turbine engines; CAE Industries in commercial flight simulators; and, Menasco, Messier-Dowty and Heroux in large landing gears. While these commercial successes are widely known throughout the world, several other firms have proven to be global competitors in such diverse market segments as space technologies, repair and overhaul, electronic systems, and advanced composites and fabricated parts.

The large and medium-sized companies that manufacture proprietary systems (e.g. complete aircraft) and subsystems (e.g. aero-engines or satellite payloads) account for the majority of annual sales. Many of these companies are foreign owned, with roughly 40% of industry revenues accruing to foreign, mainly U.S.-owned, companies. Several hundred smaller component suppliers, accounting for 5-10% of total sales, are predominantly Canadian owned and have traditionally relied upon subcontractor relationships within Canada when entering other markets.

Productivity and Competitiveness

The key determinants of competitiveness in the aerospace sector reside in the proprietary product technologies and in the way they use non-proprietary process technologies.

> For this reason, product technology is considered a key to competitiveness and has traditionally been jealously guarded. Most Canadian small and medium-sized enterprises (SMEs) are component manufacturers that rely on purchased process technologies and

> manufacturing process-engineering competence for their competitiveness. Since these technologies are available to everyone, it is the application of the most appropriate process technologies that is the source of competitive advantage for these firms.[51]

Consequently, investment in R&D averages 8% of total industry sales, including the sales of those that do not invest in R&D. Among those that do R&D, Canadian companies have been more aggressive, investing 10% of sales in R&D.

One witness expressed concern over our poor productivity performance in a particularly sensitive industry segment: "Since there is significant dependence on trade and exports, the market for aerospace goods and services is indeed global. We lag behind our major competitors in productivity performance improvements particularly at the tier three and tier four levels" [Peter Smith, 25:9:15]. The witness went on to say that the industry is very dependent on a niche strategy, a weak Canadian dollar and government aid.

> How we achieved the success I think is largely driven by a handful of successful prime contractors. We basically are export oriented and have, as I mentioned, set up strategic niche markets. There's no question that Canadian Aerospace Industry has world class capabilities. We've had to maintain this status through sustained investment in innovation and product services. There is a relatively low cost of doing business in Canada; low exchange rate of Canadian dollar makes it very competitive. We have established risk-sharing partners worldwide but we also work quite effectively with government program support such as Export Development Corporation, CCC, Technology Partnership Canada, and, of course, the SRED tax credit.
>
> We need now to concentrate on strengthening the competitiveness of the Canadian aerospace industry. Productivity is at the heart of today's competitive dynamic. Too much of the current competitiveness ... is linked to the Canadian dollar. Even a minor rise could threaten Canadian competitiveness in our sector ... [Peter Smith, 25:9:10-9:15]

The witness' proposed solution was to innovate and to invest in R&D:

> Innovation is the key to productivity growth and competitiveness. Innovation and productivity, in our view, are inextricably linked. Investing in innovation capacity is critical to Canadian productivity and competitiveness ... The status quo won't take Canada far in the global knowledge-based economy. Today the growing innovation gap threatens our economic future. We lag our competitors in R&D spending and in the adaptation and the fusion of new technologies. [Peter Smith, 25:9:10]

Industry Outlook and Policy Issues

The aerospace industry is undergoing fundamental changes in both its structure and way of doing business. While Canadian companies have performed well over the past several years, they now face numerous challenges.

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[51] Industry Canada, Sector Competitiveness Framework: Aircraft and Aircraft Parts, Part 1 – Overview and Prospects, p. 3.

In the past, new product development was driven largely by technological innovation. However, both commercial and military customers are now demanding significant reductions in the cost of their products, while at the same time demanding greater technological and operational sophistication. These demands are driving companies to focus increasingly on process, as well as product technologies, in order to come up with savings in product development, manufacturing and after-sales support; this is particularly challenging for SMEs.

Market opportunities for SMEs are also changing. Since the advent of aviation, each succeeding generation of products has been more complex until now only a few companies can afford to develop these systems. These costs and lengthening product lifecycles for products result in fewer new aircraft programs, with long and uncertain payback periods. The major systems manufacturing companies are also increasingly procuring their supplies on a global basis, while downloading technical, financial and market risks to their suppliers. The result for SMEs is fewer opportunities and a higher risk and cost of participation.

These fundamental changes in the industry are forcing many companies, large and small, to consolidate. The process started with the original equipment manufacturers and is progressing throughout the entire supply chain. The United States led this trend, but the European industry is now in the throes of significant restructuring, principally through the creation of the European Aeronautic Defence and Space Company. Global consolidation means fewer customers for Canadian suppliers and this will adversely affect Canada's downstream industry. As for the Canadian industry itself, consolidation is complicated by the high degree of offshore ownership, limited systems integrator (second tier) capacity and incomplete vertical integration. A Canadian industry perspective was provided to the Committee:

> Well, competition is intensifying … consolidation is creating larger and stronger competitors. Canadian primes face very stiff competition in the U.S., Europe, South America, and Asia. Our changing original equipment manufacturer procurement practices are shrinking the supplier base. There's a tendency, these days… to consolidate procurement. There are terms used as commodity driven procurement, which basically means that in some cases, … it provides an opportunity, but it also provides a challenge in that the smallness of some of the Canadian industries may not be able to cope with the extraordinary opportunities that are out there without major, major investments in either capital, land, or labour. The primes are also demanding fully integrated solutions and suppliers are expected to become partners. Partners are synonymous with sharing of technology and financial risks, which again, many of our companies, at the lower end of the infrastructure, are not capable of handling. Canadian primes are not immune to this changing dynamic. They, too, shop the globe for world class sources of supply, cascading impacts all the way down the supply chain. [Peter Smith, 25:9:10]

Canadian companies, which are relatively small compared to their competitors, must also deal with foreign government subsidization and market protectionism. While Canadian government programs for risk sharing, such as Technology Partnerships Canada, provide some support, U.S., European, and other competitors receive very substantial support through large-scale defence projects, defence and space R&D, or sales financing subsidies.

This combination of competitive pressures is causing significant restructuring of the entire supply chain. The suppliers to survive this drive will be those that can reduce costs, provide just-in-time delivery, and improve quality, performance, and technology capabilities. Major firms are also entering into longer term supply contracts, thereby reducing the number of opportunities for suppliers, particularly the new ones.

For Canadian industry, one that is focused on niche and foreign markets and dependent on a weak Canadian dollar for a competitive advantage, the only demonstrably effective industry-specific government policy lever has been R&D assistance; R&D is the lifeblood of this industry. In view of the recent WTO decision against certain aspects of the Technology Partnerships Canada program, the government has modified it to retain its effectiveness; but, Brazil, in particular, is petitioning Canada's amendments to the R&D program. At the same time, Canada is also petitioning Brazil for not being compliant with the WTO's ruling against its aerospace programs. The Committee, therefore, recommends:

32. That the Government of Canada seek bilateral negotiation and resolution of the aerospace dispute with Brazil in advance of any appelate ruling by the World Trade Organization.

CHAPTER 19:

THE INFORMATION AND COMMUNICATIONS TECHNOLOGIES SECTOR

Economic Contribution and Industry Structure

The information and communications technologies (ICT) sector consists of the following subsectors: manufacturing,[52] software and computer services, cable television, telecommunications services, ICT wholesaling, office machinery rental and leasing. The sector comprises 26,000 establishments, of which 1,300 are in manufacturing. These companies generated total revenues of $100 billion in 1997, representing 5.9% of GDP, and employed 481,000 people. In 1998, total exports amounted to $29 billion and there were R&D expenditures of $3.8 billion, representing 43% of total Canadian private sector R&D.

This chapter will focus on the ICT manufacturing and the software and computer services subsectors æ the two industries that develop the technology and applications æ that make up the "ICT supply" industry.[53]

The ICT supply industry contributed $22.9 billion (1992 constant dollars) to Canada's GDP in 1999. Since 1989, this sector has grown 5 times faster than the Canadian economy, with a 9.8% growth rate versus 2.1% for the economy as a whole. Of net new jobs created between 1989 and 1997, 12% have been attributable to ICT supply industry, with the software and computer services subsector having had the fastest growth.

A few large companies dominate the ICT supply industry, with fringe or niche competition coming from a large number of SMEs. For example, there are only eight home grown ICT companies with sales over $1 billion. Nortel Networks is the largest, with revenues of $32 billion in 1999. The next largest company, Celestica, had sales of about $7 billion in 1999, and the revenues of the other six were all under $2 billion. There are a number of multinationals with a significant presence in Canada: IBM, Ericsson, EDS Systemhouse, Newbridge-Alcatel, and DMR Consulting. Others, such as Lucent and Cisco, have established R&D centres in Canada.

Canadian areas of expertise include world class capabilities in telecommunications and networks (Nortel Networks, Mitel, Newbridge-Alcatel), optical technologies (JDS Uniphase, Nortel Networks) and niche strengths in software development (Corel, Cognos, Entrust, ExtendMedia), semiconductor design (PMC Sierra, Mosaid, ATI), wireless technologies (RIM, Sierra Wireless), and electronic manufacturing services (Celestica).

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[52] Consumer electronic, communications equipment, computer equipment, electronic components, wire and cable, and instrumentation.

[53] Cable television, telecommunications services, ICT wholesaling and office machinery (rental and leasing) have issues that are different. The latter are also not as export focused as the technology and applications suppliers.

As stated above, the ICT sector performs 43% of total Canadian private sector R&D. Five of the top 10 R&D performers are ICT companies: Nortel Networks alone conducted $1.8 billion,[54] representing 20% of all Canadian private sector R&D in 1998; the next largest R&D company is Pratt & Whitney, with about $400 million.

A high level of education characterizes employment in this sector; 46% of employees in the software and computer services sector and 30% in the ICT manufacturing sector have a university degree, compared to the national average of 19%. Salaries in the sector are 40-52% higher than the economy-wide average.

This sector is highly export focused. Data for software products are not available, but, of manufactured goods, 77% of all ICT manufactured goods produced in Canada are destined for export markets. Consistent with overall trade patterns, the United States is the main market, accounting for 82% of ICT exports; 7.2% are exported to the European Union and 6.4% to Asia-Pacific. Canada, nonetheless, still incurs a sizeable (and growing) trade deficit in ICT merchandise trade, principally due to higher imports of electronic components.

Productivity and Competitiveness

The ICT sector is at the heart of the Internet revolution, providing the foundation for the government agenda for the knowledge-based economy and a "connected" nation. It plays a huge enabling role in the economy as its technologies are used in every industry. It is key to Canada's economic growth, acts as a major engine for new high-quality jobs, leads in the area of innovation and R&D, offers sound infrastructure and a strong technological environment and exists in significant domestic cluster. In the words of one witness:

> Greenspan, these days, is in the enviable position of having to account for the longest economic boom in American history. He said: It is information technology that defines this special period. The reason is that information innovations lie at the root of productivity and economic growth. Its major contribution is to reduce the number of worker hours required to produce the nation's output. He then went on to provide clarity on how this reduction happens. Before this revolution in information availability most 20th century business decision making had been tampered by wide uncertainty. The remarkable surge in the availability of more timely information has enabled business management to remove large swaths of inventory safety stocks and worker redundancies. [Gaylen Duncan, 26:16:20]

Many of the ICT companies are highly competitive. Companies such as JDS Uniphase, PMC Sierra, Rogers, RIM, BCE Emergis and Celestica are now among the 20 most valued companies in Canada (in terms of market capitalization) — joining Nortel Networks and BCE Inc.

On the negative side, Canadian ICT manufacturing productivity lags behind that of the U.S. and Canada is losing ground in world export markets. Since 1996 our exports have grown at an annual rate of 8.4% and our imports at a rate of 11.5%. This has resulted in a slight decline in our overall share of the global ICT export markets.

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[54] Total Nortel R&D for 1998 was $3.6 billion; of this, $1.8 billion was spent in Canada.

The U.S. has taken the undisputed lead in this sector, being the largest market in the world for ICT and the largest supplier in the world for ICT products and applications. U.S. ICT companies are globally dominant (Microsoft, IBM, Cisco, Lucent and Intel). Many foreign companies have strategic decision making in the U.S. (Alcatel, Marconi, Ericsson and Siemens, Sony, Matsushita). The U.S. companies are setting the trends and the directions of this sector. They set the benchmarks for the rest of the world.

Canada's unique relationship with the U.S. gives it access to markets and partnerships with leading players. On the other hand, Canada is now competing head to head with the U.S. for scarce resources in three crucial areas: investment/capital, knowledge workers, and entrepreneurs.

Industry Outlook and Policy Issues

The Internet revolution is changing the face, structure and direction of the ICT industry. It has fundamentally transformed business models.

> We believe web-based e-commerce fundamentally changes the rules of business for service providers, suppliers, and customers. From a company standpoint, e-commerce provides Bell with an opportunity to revolutionize the way we interact with our existing customers. We can cost-effectively serve our customers around the clock in a very personalized way, providing real-time information access and transaction tools. This combination, enabled fundamentally by e-commerce, reduces our distribution costs by anywhere from 50% to 80% and will actually improve the level of personalized customer service at the same time. It's a pretty fundamental shift in the way we, a very traditional company, have done our business. Bell will utilize e-commerce to bring products and services to market faster, while at the same time presenting these products and services in a more integrated fashion to our customers. The intuitiveness of the web in e-commerce gives any company that harnesses its ability the ability to actually differentiate its service offering, whether they be small start-ups or existing companies. [Bill Garbarino, Bell Canada Limited, 26:16:30]

Time to market and first mover advantage are key. Talent and ideas, rather than physical assets, are driving company valuations. The enormous market potential of the Internet economy is driving this sector. Expenditures on Internet infrastructure are expected to grow 42% a year from 1999-2003 to reach $1.5 trillion U.S.[55]

Traditional sectors — telecommunications and core technologies, computer, software, consumer electronics — are being transformed by partnering, acquiring and restructuring to compete in the Internet arena. A prime example is Nortel Networks, which began as a telecommunications equipment supplier to become an Internet solutions company. New innovative companies are emerging, setting industry directions and threatening traditional companies. For example, Cisco, founded in 1984, has become a technological and market leader for Internet infrastructure products, challenging entrenched companies such as Lucent and Nortel Networks that have been around for 100 years or more.

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[55] Report from Nortel Networks Research and IDC, January 2000.

Traditional technologies are becoming Internet-centric and next generation technologies are emerging, driven by demand for Internet infrastructure and applications. ICT companies are merging with non-ICT companies to exploit each other's strengths. AOL/Time Warner and Mannesman/Vodaphone Airtouch are two of the biggest recent mergers.

The ICT sector faces a number of challenges: (1) R&D and technology efforts are concentrated in only a few key firms and technologies; (2) highly skilled workers are in short supply, which is adversely affecting Canada's capacity to conduct R&D and to attract investment; and (3) early stage financing in Canada — the so-called "angel" and venture capital investment — is extremely limited. However, government's impact on the sector will be felt mostly downstream on the services side. Here, the CRTC has gone a long way in deregulating the marketplace:

> Overall, these frameworks have resulted in opening up competition in the domestic long-distance and international telephone markets, the pay phone market, and the local telephone markets; licensing alternatives to cable, such as direct-to-home satellite services and multipoint distribution systems; not regulating the Internet — pursuant to the Broadcasting Act — but opening up the infrastructures to Internet service providers under the Telecommunications Act; reviewing the television and radio policies; establishing a basic service objective for all telephone customers; and more recently, a licensing policy for digital, pay, and specialty television services. [David Coville, 26:15:20]

While the role of government is changing, industry and consumer demand for regulation continues:

> We know we need to continue to partner with industry and government to ensure that the growth of e-commerce is guided by consistent business principles and by balanced government regulation to protect the privacy, security, and integrity of Canadians. [Bill Garbarino, 26:16:30]

The Committee concurs with these views and will echo the recommendations of the e-business roundtable by recommending:

33. That the Government of Canada provide leadership in its regulatory policies, ensuring the protection of privacy and security for Canadians while introducing competition in and between information and communications products and technologies.

And

34. That the Government of Canada: (1) establish Canada's brand in e-business domestically and globally; (2) accelerate the transformation of existing business in Canada; (3) foster e-business creation and growth; (4) expand the e-business talent pool in Canada; (5) make government online a major priority; and (6) build Canada's leadership in international Internet policy development.

As mentioned in Chapter 6, the Committee pursued the regulatory aspects of this sector because it believes the marketplace alone should not decide which regions and localities of the country will receive these new important productivity-enhancing services. Commercial viability is but one criterion; the principle of fairness is also an equally important consideration. For this reason, the

Committee applauds the CRTC's recent Telephone Service to High-Cost Serving Areas Decision that will improve the competitiveness of Canada's small business sector in the country's more remote locations, particularly since the definition of basic services was expanded to include access to the Internet. The ability of the regulator to review and influence the business plans of service and infrastructure providers (both in terms of areas served and prices) will undoubtedly reduce the likelihood that Canada's business landscape will be dotted with "have" and "have not" communities. As it was put to the Committee:

> Telecommunications today is, in and of itself, one of the most important growth industries in Canada. In addition, telecommunications is an important efficiency driver for virtually every business in Canada. Of the overall telecommunications industry, the Canadian wireless telecommunications market is among the most competitive segments. The introduction of new competitors has fueled innovation and price competition in the marketplace. Who would have thought when cellular telephones were first introduced that you would one day be able to access the Internet, e-mail, online news, and business, weather, sports, and financial services from a cellular or PCS phone? Here in Canada we have much to be proud of. We have the highest penetration of telephone service at close to 99% with a population of approximately 30 million. That's one of the highest in the world. [David Coville, 26:15:20]

The government also promotes greater telecommunications and Internet interconnection through its Community Access Program. It is in this spirit that the Committee recommends:

35. That the Government of Canada encourage greater investment in both public and private telecommunications infrastructure, particularly for the more remote communities and regions of the country.

CHAPTER 20:

THE BIOTECHNOLOGY SECTOR

Economic Contribution and Industry Structure

Biotechnology is not so much a separate industry as a set of tools with applications across a wide range of such varied sectors as health care, agri-food, the environment and natural resources, and potentially serving as a catalyst to sustainable development. It can lead to new, improved and less costly products and processes, such as new drugs and earlier detection and control of diseases. It can help reduce pollution and it can produce crops with higher yields and value-added traits and processing qualities.

The Canadian industry comprises 282 core biotechnology firms; 25% of which are publicly traded. The health care sector includes about 46% of all biotechnology companies, agri-food ranks second at 29%, followed by the environment at 11%. Small, entrepreneurial companies with fewer than 50 employees make up 72% of the industry. The industry employs just under 10,000 and there are an additional 1,900 vacant positions. Firms are located across Canada, with the highest concentration being in Quebec (31%), followed by Ontario (25%), British Columbia (20%), Saskatchewan (8%), Alberta (7%), Manitoba (3%), and the Atlantic region (6%).

> The Canadian reality is that biotechnology is a very important component of the economy … We have close to 300 core biotechnology companies in all the different sectors and on top of that we estimate … that there are approximately 100 start-up firms as well. Now 75% of these are small, by which I mean that fewer than 50 people are employed in each one and … the health care sector certainly dominates not only in the numbers of companies but also in the people employed and especially in the level of R&D that is invested … [Paul Hough, 25:10:40]

Biotechnology revenues amounted to more than $1 billion in 1998, with most of these coming from the health sector, followed closely by the agri-food sector. With R&D expenditures of $585 million in 1998 and a very high R&D-to-sales ratio, the industry is research intensive.

Productivity and Competitiveness

Unlike most other industries, biotechnology companies do not compete on production costs, but rather on intellectual property.

> Without legal access to a proprietary marketable technology, commercialization cannot occur and investment capital will not be forthcoming. While a firm may be able to license the necessary technology, when it is available, the royalty load can dramatically increase product costs. Also, restrictions usually incorporated in licences with respect to product applications, territory, etc., can also reduce profitability. Firms are therefore under pressure to develop in-house capacity for innovation and new product development.[56]

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[56] Industry Canada, Sector Competitiveness Frameworks: Bio-Industries, Part 1 – Overview and Prospects, p. 18.

Process technology improvements are also less relevant in biotechnology:

> Unlike other manufacturing sectors that strive for continuous process improvement, regulatory requirements for therapeutics make it difficult to implement any significant changes to manufacturing processes after a product has been approved for sale, because of concerns that the product may differ from that produced by the original process. A manufacturing change would precipitate a requirement for a new regulatory review, resulting in a marketing delay. Because firms are under intense pressure to get a product into clinical trials, contract manufacturing is often employed as an alternative strategy to in-house production, allowing companies to focus on their core competencies.[57]

Canada's biotechnology industry has competitive and technological strengths in selective areas, such as vaccines and therapies for cancer, acquired immune deficiency syndrome (AIDS) and neurodegenerative disease. On the services side, a related Canadian strength is in providing clinical trial services to test the safety and effectiveness of new drugs. A number of organizations have developed a solid reputation in the United States and Europe, largely because of the experience of their medical staff in conducting clinical trials, the large, multi-ethnic patient base in this country, and a public health care system that provides comprehensive patient information and tracking.

Our competitive strength in agro-biotechnology lies in animal husbandry (embryo transplants and high-quality bovine semen), plant breeding of genetically engineered canola and potatoes, yeast strains and bacterial cultures, and somatic embryogenesis for propagation of conifers and flowers. In aquaculture biotechnology, our competitive strength includes aquaculture vaccines, brood stock optimization and pool-side diagnostic tests, as well as genetic improvement programs to optimize fish growth rates and efficiency of feed conversion. Compared with that of other sectors, however, the application of aquaculture biotechnology is in its infancy. This is because of the lack of scientific knowledge about marine organisms and fish pathogens and genetics and the present small market size. In addition, a costly and burdensome regulatory process has made it more difficult to finance extensive R&D and commercial development in this country.

Biotechnology's greatest impact has been on human health care, a trend that is expected to continue in view of increasing consumer demand for innovative, life-saving drugs. Moreover, high levels of government funding and the greater availability of investment capital for basic biomedical research than for other fields (because of the prospect of higher returns) are also acting as catalysts. In other sectors, profit margins are much lower and biotechnology, rather than being a replacement for established tools, is only an additional possible solution. Many of the leading dedicated ag-biotech firms in North America have ceded ownership to large multinational chemical and agricultural corporations. This trend toward acquisition and consolidation, coupled with relatively low returns on ag-biotech stocks, points to some difficulties in taking agri-food biotechnology start-ups to the next level. The international regulatory environment is also a major factor in international competitiveness since it affects market access, ability to raise capital, costs and investment decisions.

The United States, with its particularly strong research base in health care and agriculture, dominates the global market. Dedicated biotechnology companies — firms created specifically to exploit the commercial potential of biotechnology — are concentrated in the U.S., the United Kingdom, France,

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[57] Ibid., p. 19.

Canada and Germany. These countries have a strong research infrastructure, capital, and the industrial capacity to convert basic research into products. Modern biotechnology has the potential to make significant contributions to the Canadian economy and to sustainable development through its impact on key sectors such as health care and agri-food.

Innovative companies tend to cluster near research facilities and universities:

> Clusters of biotechnology firms are quite common not only in Canada, but in other countries; Saskatoon is perhaps the best example of what can be achieved when all the different levels of government work with industry and the academic base ... [Paul Hough, 25:10:40]

R&D is key to competitiveness for this sector:

> Despite this increased funding we are meeting stiff competition from our trading partners. Even if we look to the year 2002 when the CIHR commitment is fully realized it's estimated the U.S.A. will generate four times the amount of research funding per capita. Four times more per capita than we will have in Canada. So one of our chief recommendations is that the government make a specific commitment to invest 1% of health expenditure in Canada on health research. For every $100 we put into health care set aside $1, just $1 for health research. If we do that I think we can become competitive. [Barry McLennan, 25:10:30]

Industry Outlook and Policy Issues

The worldwide market for biotechnology-based products is expected to grow from US$15 billion in 1995 to US$38 billion by 2005. Given an aging population that will consume more health care products and services, bio-pharmaceuticals will continue to hold the dominant share among the biotechnology subsectors. Some 250 novel drug products are at various stages of clinical development and are moving through the regulatory process in Canada. A fair number of these are expected to enter the market in the next 5 to 10 years. Immunodiagnostics are the next largest health application for biotechnology, with sales projected to increase 9% a year. Otherwise, the strongest growth is projected for the agri-food sector, particularly transgenic plants and animal health care.

The major challenges for Canadian governments and industry include addressing consumer concerns about biotechnology with respect to health, safety, information, ethics and the environment. Canada must also ensure that the business and investment climate can support the maturation process for these firms. This will involve maintaining the strong academic research base that has contributed to the high growth in entrepreneurial activity and start-ups, and fostering technology transfer mechanisms and industrial capability for converting research into products, building a domestic manufacturing capability, and providing access to skilled human resources. Canada's regulatory approval process is slow, however:

> "Canada slow to approve medical drugs" and the data shows Canada's target — of course by Health Canada — was 355 days. In fact from 1996 to 1998, Canada took 518 days to approve drug products, 160 days late. It's just not good enough. We're way behind the United States at 365 days, the U.K. at 308 days and Sweden at 371 days. These are our competitors. Time means money. We can't afford to lag behind like this. [Barry McLennan, 25:10:35]

The Committee is satisfied that *Budget 2000* will provide sufficient new funding over the next few years to overcome certain aspects of this deficient research and Recommendation 12 should also help. However, the Committee feels that much more research on health and environmental issues must be conducted if we are to have and preserve a productive and competitive biotechnology sector for the future. The Committee, therefore, recommends:

36. That the Government of Canada provide more funding for health and environmental research on genetically engineered and modified foods and new pharmaceutical products.

CONCLUSION

Following World War II, Canada started out in a relatively healthy position with its productivity and standard of living growing rapidly and probably peaking in the late-1960s to early-1970s. From this point on, poor business sector investment in physical capital, particularly machinery and equipment, and poor productivity by Canadian-owned SMEs — the two are not unconnected — had dragged down productivity growth rates and reduced the competitiveness of the Canadian manufacturing sector. Consequently, Canada has been slow to shift resources from traditional and mature industries to new age and high technology activities, particularly the industrial machinery and electrical and electronic equipment sector. In other words, Canada has been following, rather than leading, in the passage to a knowledge-based society.

Canada's imbalanced corporate tax structure has been identified as contributing to poor investment rates and slow productivity growth in certain key industries. Industry's heavy reliance on imported R&D and on the general corporate culture in which innovations pioneered by foreign competitors are replicated, rather than adopting a strategy of innovation in the first place, is also a contributing factor. While Canada has a few notable industry leaders in the high growth industries of the future, inadequate strategic responses by both industry and government has led to excessive reliance on a low-value dollar. Thus, laggard firms across many sectors of the economy are vulnerable to tough times, if not extinction, whenever any significant new strength appears in the Canadian dollar.

Not surprisingly, the Canadian standard of living began to slide not long after growth in labour productivity declined; and a chronic economic malaise gripped the nation as declining real wages and ever-rising taxation (to cover income redistribution commitments) produced lower disposable incomes for the average Canadian family. Despite this gloom, there were notable policy advances during this period that continue to bode well for Canadian productivity and competitiveness; they include commercializing and privatizing selective government operations and varying levels of deregulation of most transportation, communications and energy industries. The historic opening up of international markets through freer multilateral trade and regional free trade agreements æ with disputes settled by the rules governing trade and not brute size and force æ have also been positive developments.

Since the late-1990s, the Government of Canada has worked hard and diligently at getting its fiscal house in order, reversing what was 30 consecutive years of budget deficits, the highest tax levels in Canadian history, and the largest build-up of federal debt in peacetime into a situation of budget surpluses, tax cuts and debt paydown. This reversal of fiscal fortunes has coincided with what appears to be an innovation boom, in which new products and technologies proliferate and productivity and economic growth are once again being fuelled. Evidence is everywhere in the economic statistics.

The Government of Canada has begun to embark on an innovation agenda. Increased government-sponsored R&D in cooperation with the private sector, backed up by almost $2 billion in new federal spending over the next three years, is the first prong. A lower corporate tax rate for those sectors outside the traditional manufacturing and processing sector, most notably high technology companies, is the second. The reduction in capital gains subject to taxation (from three-quarters to two-thirds) and the deferral of taxes due and payable on employee stock options (from the exercise date until the sale of the stock) is the third.

This Committee praises the Government of Canada for these initiatives and wants to reinforce them. It calls on the Government of Canada to broaden its innovation agenda to include other complementary initiatives as part of a grander productivity agenda, beginning in the upcoming fiscal year. Its objective would be to raise the business sector's productivity growth rates above the average posted by the G-7 countries on a consistent year-to-year basis.

The Committee further calls upon the Government of Canada, as part of its productivity agenda, to stimulate business sector investment in physical capital, in particular machinery and equipment, with the aim of raising Canada's investment rate above that of the G-7 country average. Specific attention to Canada's capital cost allowance is recommended; it should be modified to ensure it acurately reflects the economic life of the asset in question. The government is also encouraged by the Committee to invest more aggressively in public infrastructure, particularly in the transportation and communications networks.

The Committee is convinced that growth in the Canadian economy will be strong over the next several years and a positive fiscal position will make it possible for the government to dramatically raise all personal tax brackets, as well as the basic personal exemption. The Committee also recommends a further reduction in the amount of capital gains subject to tax, from two-thirds to one half.

The Committee would have the government actively pursue the integration of lifelong learning as a cooperative venture of labour, industry and government to assure continued growth of the skill, ability and knowledge of Canadians for the workplace. Specifically, the government should promote lifelong learning through a new educational savings vehicle. Benefits that go directly to the individual and allow him or her to shop for the best private or public training and education would seem better suited to tomorrow's knowledge-based economy than government-supplied training programs. This new education savings plan would permit individuals and their employers to contribute towards work skills training and education, on a tax-free basis.

The Committee would also like to see the Government of Canada formalize its innovation agenda by committing the innovation component of the productivity agenda to a five-year plan of increasing expenditures for R&D, with the objective of reinforcing the upward trend in Canada's R&D-to-GDP ratio established in the 1990s. The government is further advised to strengthen its policy position with respect to intellectual property. Finally, the Committee recommends that the government perform an information and demonstration service with respect to emerging and new technologies and processes to facilitate technology adoption in Canada.

The Committee is convinced that these recommendations, along with those targeted for key sectors of the economy, will go a long way to revitalizing Canada's productivity and standard of living growth rates, enabling them to reach the levels of the 1960s and thereby restore Canada's near-top world ranking. They will also better prepare Canadians and Canadian businesses for the opportunities and challenges presented by a knowledge-based economy. The Committee's objectives are real and obtainable; we begin with a well-educated labour force and a strong corporate culture. As we said at the outset of this report, our vision is one where Canada sheds its "hewers of wood and drawers of water" image for one that is innovative and productive. An innovative and productive Canada will be a competitive and prosperous Canada.

REQUEST FOR GOVERNMENT RESPONSE

Pursuant to Standing Order 109, the Committee requests that the government table a comprehensive response to this Report within one hundred and fifty (150) days.

A copy of the relevant Minutes of Proceedings of the Standing Committee on Industry (*Meetings Nos. 2, 3, 5, 6, 8, 10, 11, 13, 18, 19, 20, 22, 23, 25, 26, 28, 29, 33, 34, 35, 36, 37 and 38 which includes this Report)* is tabled.

Respectfully submitted,

Susan E Whelan

Susan Whelan, M.P.
Essex

Chair

Canadian Alliance of Canada
Dissenting Opinion
April 3, 2000

Introduction

The Standing Committee on Industry undertook its study on productivity in response to concerns expressed by many prominent economists and business leaders. They warned of an alarming gap developing between Canada and our major trading partner, the United States, particularly over the past decade.

These leaders warned of the dangers inherent in not addressing this issue. They also confirmed through statistical evidence what Canadians instinctively already knew: Our standard of living had fallen over the past 30 years and the rate of decline had accelerated during the 1990s.

While the Standing Committee's report did a good job in providing a 30-year history of this decline and in documenting our current situation, it failed to identify the underlying reasons for Canada's deteriorating productivity.

The Official Opposition argues that this failure is an important weakness of the report. For, if we fail to understand, or choose to ignore the fundamental reasons for this decline, it will impair our ability to offer constructive solutions. It is in this context that the Canadian Alliance members feel compelled to offer a dissenting opinion to this report.

The Role of Government Policy

The issues related to Canada's loss of productivity and weakened competitiveness are complex. Many factors, including external shocks to a country's economy, can cause disruption. However, some countries such as the United States are better able to adapt and restructure their economies. The restructuring that took place in the U.S. during the 1980s enabled the Americans to lead the world in growth for much of the 1990s.

Canada, however, did not enjoy the same level of growth. For almost a century, the Canadian and U.S. business cycles were synchronized and could be charted with no divergence between the two. Between 1900-1980, Canada never experienced a recession without a corresponding recession in the United States. It is no small coincidence that Canada's business cycle began diverging from the U.S. in the late 1960s, after the Canadian federal government expanded rapidly and became more interventionist.

The Official Opposition believes the role played by public policy in Canada during this period is a significant factor that needs to be examined. We suggest the fundamental shift in government policy in the 1960s and 1970s created the conditions that led to Canada's decline in productivity and currency devaluation.

Over the years, major social programs were introduced and the federal government expanded through successive Liberal and Conservative administrations. Changes made to Unemployment Insurance, for example, moved it away from the concept of insurance to more of a social program function. The result was an increase in Canadian unemployment rates several points higher than that of the United States.

Meanwhile, federal program spending continued to grow every year, which had to be financed by tax increases and deficits. The accumulated deficits created a federal debt of over $575 billion. Currently, one-third of each tax dollar sent to Ottawa is required to pay for the interest on our national debt.

> The last half of the 1990s challenged "the Canadian Way." Many of our traditional economic and social policies proved unsustainable. As we go forward, as part of North America, we must revitalize ourselves so we enter the next century filled with conviction, truly believing that we can achieve our potential, preserve our values and live safe and productive lives....The past 30 years taught us — as productivity growth slowed, programs were continually augmented, and the deficit piled upon deficit — that social programming established largely in the 1960s was unsustainable. This lesson must not be lost as we search for sustainability. Taxpayers must agree to share for the common good with those less fortunate and, at the same time, believe that they received value for their tax dollars. Performance and Potential 1999: Conference Board of Canada, p. 2

Liberal Government Response Weak

In *Budget 2000*, the Liberal government proposed very tentative steps to improve Canada's productivity. However, *Budget 2000* cannot resolve the problems caused by 30 years of misguided public policy.

Canada currently finds itself in a very competitive tax environment, which is becoming more competitive all the time. As such, the overdue tax cuts in *Budget 2000* are welcome, but their value is hampered by long phase in periods and other half-measures. For example, the corporate tax rate is not scheduled to decrease until 2001, and then by only 1%. The planned seven-point reduction will not be achieved until 2005.

As the United States, France and Germany continue to reduce taxes in order to increase their productivity levels, Canada will continue to fall behind. Canada currently holds the unenviable position of having the highest personal income tax rate, as a percentage of GDP, of all the G-7 countries. Canadian tax rates on manufacturing and service sectors are becoming the highest in the G-7, as rates in those countries decline. The Official Opposition believes that Canadian industry and citizens deserve a level taxation playing field.

Moreover, the $86.3 billion in new government spending announced in *Budget 2000*, clearly demonstrated that the federal government's priority is to continue increasing its program spending. The Liberal government claims to take decisive action in paying down the debt, but its current commitment of $3 billion annually pales in comparison to the $13 billion handed out in the form of grants and contributions. At $3 billion a year, it will take 191 years to retire the debt. Meanwhile, a half a percentage rise in interest rates would increase charges to the national debt by $5 billion, annually.

Investors take small comfort in the weak assurances and tepid measures found in *Budget 2000*. The Canadian Alliance believes bold measures are needed to restore confidence in the Canadian economy. The Official Opposition agrees with leading Canadian Economist Pierre Fortin when he advised that the best answer to Canada's declining standard of living is to cut taxes and pay down debt.

Confidence Crucial to Improve Productivity

Investor confidence is a very important factor as companies seek profit and increased productivity in this globally competitive environment. Unfortunately, the signals generated by government policies over the past 30 years have not instilled the confidence required to increase investment, which is necessary to improve our productivity and standard of living. As a result, the percentage of Foreign Direct Investment (FDI) in Canada has steadily declined over the past several years. Even Canadians are increasingly looking beyond our borders for better opportunities for investment. Canada is now a net exporter of FDI.

These problems have led many Canadian professionals and businesses to move to the United States to take advantage of better opportunities created by increased economic growth. While Canada's economy has also grown during this period, some witnesses have suggested that the increase in exports was made possible by maintaining the discounted Canadian dollar. They cautioned that relying on a low Canadian dollar for a competitive edge could impair productivity for a longer term and give Canadian manufacturing and exporters a false sense of security.

> Surely to goodness....If 68¢ was a good idea, why don't we try 50¢? Depreciating our currency will not serve us well....At some point, there is a relationship between the cost of stuff we import and consume and our currency ...The reason we've been focusing on this issue about competitiveness and the Canadian dollar is that over a long enough period of time, it's going to ... start to show up, and it will show up in weakened competitiveness in our industries. Conference Board of Canada — Jim Frank, Vice-President and Chief Economist, 8:10:05

Canadian Alliance's Proposal to Improve Productivity

The Canadian Alliance recognizes the importance of government leadership for improving productivity. Therefore, upon becoming government, we will introduce a "**Confidence Budget**." Its chief intention will be to provide tax reform, tax relief and a road map for government direction in fiscal policy. Unlike *Budget 2000*, the Canadian Alliance Confidence Budget will send the right kind of signals to markets, businesses, investors and individuals, so they will react positively to further stimulate our economy.

The Canadian Alliance recommends Solution 17 as a bold move to restore public confidence in the fairness of the Canadian tax system by reducing its complexity and its revenues. Solution 17 would see Canada move to a simpler tax system, built around a single rate of 17% taxation to ensure lower taxes for all Canadians.

> The tax reduction proposals...are well focussed on the needs of Canadians today. They expand the economy and most powerfully: personal disposable income, consumption and our standard of living. They create jobs. By lowering marginal tax rates, they are particularly in stimulating work effort and stemming the brain drain and other productivity enhancing features. By powerfully reducing the level of personal income tax, particularly for Canadians of average and above average income, they are well directed at providing a more competitive tax environment in Canada relative to that of the United States. The Economic Impact of the Reform Party's Proposals for Personal Income Tax Reduction, Dale Orr and Bob Dugan, WEFA Inc., p. 29-30

The Confidence Budget would signal the end to the federal government's inclination towards wasteful spending and encroachment on provincial jurisdiction, which will also reverse the need for excessive taxation. Getting the government out of business, by privatizing crown corporations, ceasing to give public money for private profit through business subsidies and terminating dubious regional development programs will drastically reduce the government's need for taxpayers' dollars.

In addition to cutting taxes and government spending, the Canadian Alliance believes the federal government should concentrate on creating a better environment for business in Canada by eliminating unnecessary regulations and interprovincial trade barriers, as well as vigorously pursuing the reduction of international trade barriers, tariffs and subsidies.

Conclusion

Canada, the second largest country in the world, has a vital pool of human and natural resources. We have untapped potential for growth, but need the proper environment to nurture our prosperity. The Canadian Alliance is confident that Canada can regain our prosperity and competitiveness. However, strong government leadership is required to provide crucial fiscal responsibility. This is not found in *Budget 2000*. Canadians deserve a significant reduction in taxes through tax reform and prudent management of government departments. With the public policy environment shaped by a Confidence Budget, Canadians will have renewed confidence to invest in Canada's future.

The Standing Committee on Industry
Canadian Alliance Members

Charlie Penson, Industry Critic
Werner Schmidt
Jim Hart

BLOC QUÉBÉCOIS DISSENTING OPINION

The Bloc Québécois MPs on the Industry Committee agree with a number of the views expressed in the report by the Standing Committee on Industry entitled *Productivity and Innovation: A Competitive and Prosperous Canada*. We entirely support the objective of bringing Canadian productivity above the G-7 average. Canada must also work to change the dynamic with the United States, where our relative productivity is trailing, especially in the manufacturing sector. In the long term, maintaining a high standard of living depends on our capacity to improve productivity while treating human beings and the environment with respect.

The Bloc Québécois is also pleased that concern with productivity has gone beyond the new technologies sector. The more traditional sectors, such as natural resources, are an important component of the Quebec and Canadian economy because, in addition to being consumers of technology, they are a source of innovation and progress. We must therefore not lose sight of our comparative advantages and our traditional strengths, which the Department of Industry too often seems to forget.

Recognizing and supporting the provinces' efforts

However, the Bloc Québécois is disappointed that the Industry Committee did not give more consideration to the key role of the provinces in coping with the challenge of productivity. The federal government must support the development strategies of the various regions, not try to impose one development model. Moreover the provinces, through their education systems and training programs, play a decisive role in individuals' capacity to adapt to changes in the economy. The federal government would be well advised to recognize this, by increasing transfers to the provinces, especially for post-secondary education. This is a crucial element, but one that has been left out of the report. The federal government must recognize and support the efforts of the provinces, which through education, health, economic development programs, their tax systems, etc., play a vital role in increasing productivity.

In this perspective, the tax imbalance that is growing between the provinces and Ottawa is extremely troubling. The federal surplus, estimated at $100 billion in the next few years, is an excellent illustration of this. The federal government's temptation to spend this money, especially in areas of provincial jurisdiction, is omnipresent, and the Bloc Québécois believes that the public interest would be better served by a rebalancing of means and responsibilities.

More specifically, the Bloc Québécois calls on the federal government to talk to the provinces before introducing concrete measures that concern them. For example, the education savings plan, whose objectives are praiseworthy, must be harmonized with the provinces, because in Quebec, for one, there is already a program requiring businesses to invest 1% of total payroll in employee training.

2000-01 federal budget

The Bloc Québécois members of the Committee want to put a distance between themselves and the reverent attitude that the current report and recommendations display toward the 2000-01 federal budget. In the Bloc's opinion, the most recent federal budget could have been much more ambitious in certain areas, especially transfers to the provinces. In addition, more substantial income tax reductions would have helped to improve more rapidly the conditions that promote productivity.

Weakness of the Canadian dollar

In the Committee's recommendations, the Bloc Québécois would have preferred more boldness about the problem of exchange rates in the new international context. The introduction of the Euro and the possible dollarization of certain Latin American countries are harbingers of another period of sharp fluctuations for minor currencies like the Canadian dollar. Such fluctuations could seriously undermine any attempt to raise productivity levels. The Bloc Québécois therefore hopes that there will be a public debate on moving to a North American currency, in order to determine the advantages and disadvantages this would pose for our economy. There is no point sticking heads in the sand on this, and taking refuge in narrow nationalism by refusing even to discuss it.

Mining exploration

With respect to mining exploration, the Bloc Québécois would like the federal government to recognize that there is still mining potential and therefore to assume a greater role in financial support for exploration. For example, alternative measures should perhaps be envisaged if flow-through shares no longer suffice.

Shipbuilding

While it supports the report's two recommendations on shipbuilding, the Bloc does not think they go far enough. Failing repeal or amendment of the United States' *Jones Act*, the Committee's recommendation should call on the Government of Canada to try to get shipbuilding and marine transport included in the North American Free Trade Agreement (NAFTA). The Government of Canada should also adopt policies that would have Canadian shipowners building and/or repairing their vessels in Canada. Lastly, the Bloc finds it regrettable that the report makes no mention of the four joint demands from the Shipbuilding Association of Canada and the shipbuilding workers' coalition, which have been reiterated so often in committee.

Improving the quality of life

The Bloc Québécois also wants to issue a caveat: the federal government must not be given the opportunity to make use of the recommendations on awareness of the importance of productivity (chapter 2) and information on emerging technologies and procedures (chapter 3) as propaganda instruments instead of as economic development tools.

Care must also be taken to ensure that the development of new technologies, especially in the agri-food sector, is accompanied by independent studies of their long-term impacts on health and the environment. The federal government would benefit from making the process for evaluation new products more transparent and developing independent research expertise. More solid government expertise and more transparent evaluation exercises would make it possible to guarantee market outlets. The issue of labelling for bio-engineered products must be studied as soon as possible.

The Bloc Québécois members of Committee want to make very clear that productivity is a means of improving quality of life and not an end itself. The Committee's report too often loses sight of the aspect of productivity that is both human and economic. For example, in the chapter on agriculture only a quantitative analysis is proposed for this sector. And yet the existence of small family farms is also a rural development issue. This dimension is entirely absent from the report. We must not lose sight of the human beings who should be at the centre of concerns and decisions. Workers must remain allies, and improving productivity must be a shared goal.

Regional communities

The Bloc Québécois is delighted that the Committee has acknowledged how important it is for the government to be concerned about the regional telecommunications infrastructure. This is an essential tool if regional communities are to take their full place in tomorrow's economy.

It is however regrettable that the Committee has not recommended reinforcing the capital access mechanisms available in the regions. The worst is still to come, since last June's *White Paper* on reform of the financial services sector contained not a single measure designed to keep bank branches in the regions.

Conclusion

The Bloc Québécois members of the Industry Committee hope that concrete measures will be put forward and significant action taken, in collaboration with the provinces, to increase productivity. We must not forget that increased productivity ultimately means a higher standard of living for Quebeckers and Canadians. The really important thing is that the members of our society be the main beneficiaries of a more productive economy.

A DISSENTING OPINION
NEW DEMOCRATIC PARTY
APRIL 2000

This report is an accurate reflection of what was heard from witnesses and the NDP concurs with its findings and recommendations with a few caveats.

The Committee heard from a wide range of witnesses and each brought their own particular perspective on the causes and solutions to the productivity issue.

What became clear is that productivity measurement is complex, unwieldy, not always conclusive, and therefore not entirely reliable as a measure for every initiative of government.

It is also clear that productivity does **not** mean that workers need to work longer and harder. It **does** mean that we have to find ways to work in new and better ways. This is supported by the examples of European countries having higher productivity although their workers may have an equal or shorter workweek than Canadian workers do.

Due to the complexities of productivity, there is a wide range of areas that deserve government action. The NDP supports those recommendations that call for: increased public investment in transportation and communication infrastructure, incentives for technology adoption, easier access to R&D programs for small-medium enterprises, changes to the financial services sector, recognition to support "life-long" learning, better price and income support for farmers, an abandonment of the Softwood Lumber Agreement, a need to enhance mining exploration, addressing First Nations land and treaty issues, a repeal of the *Jones Act*, a call for a shipbuilding policy, and an examination of the issue of genetically modified foods.

The NDP believes that a highly trained, well-educated and skilled workforce are key to increasing productivity in Canada. If the federal government is really serious about raising productivity levels and preparing Canadians for the knowledge economy, reinvestment in education must be a main priority. We strongly endorse all aspects of the report that encourage government action to support a top-notch training and education system.

The NDP rejects any devolution of labour market programs that undermine the funding bases of community colleges across the country, favour private for-profit trainers, and pass all of the risk for retraining onto individuals, who at the end of the day may end up with nothing more than debt.

Innovation and its contribution to productivity and rising incomes are paramount to Canada's success in the new economy. Witnesses pointed to the need for Canada to adopt a comprehensive innovation strategy that would increase investment in R&D and in both physical and human capital.

The NDP also supports innovation through initiatives such as "Centres of Excellence" and the new "Research Chairs". While enhancing innovation and productivity, these initiatives will also help to establish Canada as a major player in the economy of the 21st century.

The NDP differs with the report and its recommendations in the area of taxation. Tax rates are often blamed as the culprit to lower productivity. Yet, countries such as France and Germany have higher ratios of tax to GDP than Canada while achieving higher productivity levels as well. Incremental tax changes result in a more complex and confusing system with built-in biases and unfairness. Rather than the ongoing tinkering to the taxation system, the NDP recommends a thorough overhaul of our tax system similar to the Carter Commission's approach to tax reform.

The call to dismantle interprovincial barriers begs the question: "Why have these efforts stalled?" In order for all provinces and areas to compete on "a level playing field", outdated and unnecessary barriers should be dismantled while still allowing flexibility for regional programs and considerations; particularly in disadvantaged areas of the country.

The NDP believes the recommendation on foreign ownership is misplaced. Any consideration of foreign ownership must include social, cultural and political implications as well as economic. Statistics demonstrate that foreign ownership in Canada largely involves takeovers and mergers that are not always in our nation's best interest. When head offices, investment and R&D remain south of our border, then a loss is experienced in Canada's productivity level.

Furthermore, the NDP is concerned that the export advantages provided by our low dollar may be giving a distorted view of the strength of our export sector. We are a trading nation and must assume that our competitive advantage is not primarily the result of our currency's low value.

In conclusion, the NDP would like to depart from the report's conclusions that refer to policies such as freer international trade, massive privatization, and deregulation in key industries such as transportation, communications and energy as "positive developments" to Canada's economy. If this was the case, then the impact of these policy changes during the past 10 years should have produced a gain rather than the decline we have actually experienced in our nation's productivity.

As it turns out, the nineties proved to be a loss decade and the economic fundamentals were weaker than they have been since the 1930s. Per capita GDP had not risen through this decade. Real living standards declined for a majority of Canadians and increased poverty became a regrettably by-product. Along with the widening of the income gap, Canada also experienced a growing disparity between select urban centres and the rest of the country that was excluded from the introduction of new economic and technological changes.

The NDP believes that a productive economy is the key to the things Canadians desire for themselves and their families: a good job, a decent standard of living and an optimistic future for their children. With wise investments, effective social programs, and fair tax policies, New Democrats believe the federal government can be instrumental in establishing the conditions for growth and full employment in Canada's mixed economy, provide the public services Canadians desire, and reduce inequality, all within a responsible fiscal framework. We are committed to policies that will make these goals a reality for *all* Canadians.

APPENDIX 1

PRODUCTIVITY DEFINITIONS AND MEASUREMENT

Definitions

Productivity is one of a number of key indicators of the vibrancy or strength of an economy. It measures the relationship between the physical volume of goods and services produced and the resources used in their production and the transactions processes adopted by the economy. As an outputs-to-inputs measure, productivity bears directly on the efficiency with which one uses resources æ natural, human and man-made æ and, therefore, provides a gauge of the productive capability of an economy, whether the unit of analysis is the plant, firm, industry, sector, region, nation, province or country.

Of the numerous productivity measures available, the most widely used is labour productivity, since it is the easiest to calculate and understand. Labour productivity is simply defined as the ratio of goods and services output (usually GDP) to the labour input, represented either by employment or hours worked. Labour productivity is likely to be the most important measure of resource use efficiency precisely because labour's share of national income is the largest by far of all factors of production. As a partial productivity measure, however, labour productivity can be influenced by a number of other factors of production, such as the amount of capital, the quantity and quality of the endowment of natural resources, the organization of production, and the institutional setting. As such, the intensity of labour effort or the integrity of the work ethic of the labour force can influence labour productivity, but the amount of capital and the type of technologies associated with each worker will together and separately have a significant impact on this productivity statistic. Thus, the true source of productivity cannot be disentangled and separated out so that independent cause and effect judgments are impossible without some measure of qualification. Finally, labour productivity growth is defined as growth in output minus growth in labour input. So if GDP grew by 6% and both the number of persons employed or hours worked by the labour force grew by 1%, then, using either definition, labour productivity grew by 5%.

Total or multi-factor productivity is also an influential measure of the strength of an economy, as it was devised to isolate the contributions of all factors of production to output growth. This productivity measure bundles labour, capital (the accumulation of past investments, both fixed and inventories) and intermediate inputs (including materials and energy) together according to the weight given to their share of output. As such, multifactor productivity growth is defined as output growth minus the growth of the combined inputs. For example, when output growth is 6% and labour, capital and intermediate inputs have equal shares in output and grew by 1%, 2% and 3%, respectively, multifactor productivity growth would be 4% according to the calculation: 6% – 1/3 (1% + 2% + 3%).[1, 2]

Finally, as suggested above, neither of these measures is superior to the other. The two were devised with different purposes in mind. In considering the standard of living of a country, labour productivity is the more appropriate statistic as it measures the amount produced by the average worker and thus the amount of income earned and available to the population. When considering the efficiency of all inputs used in the production processes of a firm or plant, multifactor productivity is the appropriate statistic, as it measures the impact of different combinations and levels of resources on output.[3]

Measurement

The calculation of any productivity index, which is essentially a ratio of two statistics, combines two sets of measurements. The first measurement deals with outputs, which can be determined either by using real value-added or real gross output.[4] The first defines output as factor incomes (basically labour and capital) in an industry, sector, or economy, discounted to eliminate any inflationary bias in the nominal dollar values. The second defines output as the physical goods and services produced by an industry, sector or economy (discounted for inflation using the most appropriate price deflator). At the industry or sectoral level, real gross output comprises real value added and the real value of intermediate goods. At the aggregate level, real gross output is equivalent to real value added, since the real value of intermediate goods will net out from the calculation. The second measurement involves inputs. The labour input is measured by total hours worked (average employment multiplied by the average number of hours worked). Capital services are measured from current dollar capital stock estimates (using the perpetual inventory technique from the flow of investments) and a capital stock price deflator to neutralize any inflationary bias in the data series.

There are two notable caveats when analyzing industry-specific productivity performances. First of all, real value added is the relevant measure of output at the industry level when using either labour or labour and capital as inputs; real gross output may bias the calculation when intermediate inputs can substitute for labour and capital in the production process. However, when intermediate inputs are included, then real gross output is the relevant measure. Observing this rule will eliminate the

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[1] This assumption of equal shares of output is not meant to reflect reality but to simplify the calculation for illustrative purposes.

[2] Note that the labour productivity measure grew by 5% in this example. In this case, the capital-labour ratio rose by 1% (capital grew by 2%, labour by 1%) and the intermediate inputs to labour ratio rose by 2%. Thus, labour productivity, as a partial productivity measure, showed more growth than the multifactor productivity measure precisely because these other inputs grew faster than the labour input. Had the labour input grown faster than these other inputs, the labour productivity growth rate would have been smaller than the multifactor productivity growth rate (holding the assumption of equal shares in output).

[3] The efficiency of input usage has wider implications for management of a firm than is widely understood. Having a solid handle on this measure for all or, at least, the major aspects of a company's activities, along with some knowledge of labour, material, energy and capital costs, a manager could optimally allocate his available resources to maximize the company's competitiveness. This allocation would also include the economic merit of contracting out some activities or functions.

[4] Value added is simply defined as the value of shipments minus the materials, services and energy purchased.

potential bias that would result from an increase or decrease in the tendency for industry to contract out work. On the other hand, comparing the two calculations would provide some indication of how contracting out has affected the productivity of the industry.

Finally, when analyzing the productivity of an industry over time, one must take into account the entry and exit of firms and establishments. For example, a declining (expanding) industry will likely experience a reduction (an increase) in the number of establishments — most likely the exit (entry) of the least productive — and possibly in the number of firms through mergers and consolidations. Without accounting for changes in the industry's composition or these types of restructuring, aggregate industry productivity growth rates may bias the result. That is, productivity increases in declining industries will be overstated when the least productive firms and plants exit the industry. The resultant boost in productivity cannot and should not be attributed to the remaining firms. Similarly, productivity increases in expanding industries will likely understate the productivity growth rates of incumbent firms.

APPENDIX 2

LIST OF WITNESSES

Associations and Individuals	Date	Meeting
Department of Industry	1999/11/02	2
Serge Nadeau, Director General, Micro Economic Analysis Directorate		
Statistics Canada		
John Baldwin, Director, Micro Economic Studies and Analysis		
National Research Council of Canada	1999/11/02	3
Arthur Carty, President		
Department of Finance	1999/11/16	5
Paul Berg-Dick, Director, Business Income Tax Division		
Miodrag Jovanovic, Tax Policy Officer, Economic Development		
Department of Industry		
John Banigan, Assistant Deputy Minister, Industry Sector		
Ninon Charlebois, Director and Manager, Briefings and Strategic Management		
Brian Kissner, Issues Policy Officer		
Export Development Corporation		
Glen Hodgson, Director, Government and International Relations		
Daniel Primeau, Relationship Manager, Transportation Equity and Business Team		
Canadian Labour and Business Centre (formerly known as Canadian Labour Market and Labour Productivity Centre)	1999/11/16	6
Chris Parsley, Senior Economist		
Arlene Wortsman, Director, Labour and Acting Co-Chief Executive Officer		
York University	1999/11/16	6
Don Daly, Professor		

Associations and Individuals	Date	Meeting
Centre for the Study of Living Standards	1999/11/23	8
Andrew Sharpe, Executive Director		
Conference Board of Canada		
Jim Frank, Vice-President and Chief Economist		
Brenda Lafleur, Principal Research Associate		
Informetrica		
Michael McCracken, Chairman and Chief Executive Officer		
Canadian Chamber of Commerce	1999/11/30	10
Michael Murphy, Senior Vice-President, Policy		
Peter Tzanetakis, Director, Policy		
WEFA Canada Inc.		
Dale Orr, Economist		
As Individual		
David Slater, Former Chairman of the Economic Council of Canada		
Canadian Association of Petroleum Producers	1999/11/30	11
Bill Simpkins, Vice-President, Government Relations and Communications		
Andrew Stephens, Member of the Association		
CAW Canada	1999/12/07	13
Robert Chernecki, Assistant to the President		
Marine Workers Federation	1999/12/07	13
Gary Marr, President		
Bern Harty, Vice-President		
Les Holloway, Executive Director		
Terrence O'Toole, President, Marine Workers, Local 3		
"Syndicat des travailleurs du chantier naval de Lauzon"		
Richard Gauvin, President		
Canadian Shipowners Association	1999/12/14	18
Donald Morrison, President		
Réjean Lanteigne, Vice-President, Operations		

Associations and Individuals	Date	Meeting
Chamber of Maritime Commerce Raymond Johnston, President Jim Campbell, Vice-President and General Manager	1999/12/14	18
Shipbuilding Association of Canada Peter Cairns, President		
Department of Foreign Affairs and International Trade Louise Charron Fortin, Director General, Trade Commissioner Service, Planning and Policy John Curtis, Senior Policy Advisor and Coordinator Trade and Economic Analysis Division	2000/02/08	19
Department of Industry Rocco Delvecchio, Executive Director, Investment Partnerships Canada		
Simon Fraser University Richard Harris, Professor of Economics	2000/02/08	20
University of British Columbia John Helliwell, Professor of Economics Jonathan Kesselman, Professor and Director	2000/02/08	20
Canadian Institute for Advanced Research Fraser Mustard, Founding President and Bell Canada Fellow	2000/02/15	22
Institute for Sustainable Development Colin Isaacs, President, Contemporary Information Analysis Ltd.		
National Round Table on the Environment and the Economy Stuart Smith, Chairman David McGuinty, Executive Director and Chief Executive Officer		
Nesbitt Burns Douglas Porter, Senior Economist and Vice-President		
TD Bank Financial Group Peter Drake, Vice-President and Deputy Chief Economist		

Associations and Individuals	Date	Meeting
University of Toronto Roger Martin, Dean, Rotman School of Management	2000/02/15	22
Canadian Association of Petroleum Producers William A. Friley, Jr., President and CEO, Triumph Energy Corporation David MacInnis, Vice-President of Strategic Planning	2000/02/15	23
Mining Association of Canada Gordon Peeling, President and Chief Executive Officer		
Aerospace Industries Association of Canada Peter Smith, President and Chief Executive Officer	2000/02/22	25
BIOTECanada Paul Hough, Vice-President	2000/02/22	25
Canadian Auto Workers Union Bill Murnigham, National Representative		
Coalition for Biomedical and Health Research Barry McLennan, Chair Charles Pitts, Executive Director		
Theratechnologies André de Villers, President and Chief Executive Officer		
As Individual John Oliver, President, Maple Leaf Bio-Concepts		
Bell Canada Bill Garbarino, Vice-President, Electronic Services	2000/02/22	26
Canadian Radio-Television and Telecommunications Commission David Colville, Vice-Chair, Telecommunications Shirley Soehn, Executive Director, Telecommunications Paul Godin, Director, Independent Carrier Relations		
Information Technology Association of Canada Gaylen Duncan, President and Chief Executive Officer		
Alliance of Manufacturers & Exporters Canada Jayson Myers, Senior Vice-President and Chief Economist	2000/02/29	28
Canadian Federation of Agriculture Sally Rutherford, Executive Director		

Associations and Individuals	Date	Meeting
Canadian Pulp and Paper Association	2000/02/29	28
Fiona Cook, Vice-President, International Trade and Government Relations		
Steve Stinson, Director, Finance and Business Issues		
Canadian Vehicle Manufacturers' Association		
David Adams, Vice-President of Policy		
Natural Sciences and Engineering Research Council of Canada		
Thomas Brzustowski, President	2000/02/29	29

APPENDIX 3

LIST OF SUBMISSIONS

Aerospace Industries Association of Canada

Agricore Cooperative Ltd.

Alliance of Manufacturers & Exporters Canada

Association of Canadian Community Colleges

BIOTECanada

Canadian Association of Petroleum Producers

Canadian Auto Workers Union

Canadian Chamber of Commerce

Canadian Chemical Producers' Association

Canadian Institute for Advanced Research

Canadian Petroleum Products Institute

Canadian Pulp and Paper Association

Canadian Radio-Television and Telecommunications Commission

Canadian Vehicle Manufacturers' Association

Coalition for Biomedical and Health Research

Department of Foreign Affairs and International Trade

Department of Industry

Information Technology Association of Canada

Informetrica

Marine Workers' Federation

Mining Association of Canada

National Research Council of Canada

Natural Sciences and Engineering Research Council of Canada

Statistics Canada

“Syndicat des travailleurs du chantier naval de Lauzon”

Theratechnologies

University of British Columbia

WEFA Canada Inc.

MINUTES OF PROCEEDINGS

Tuesday, April 4, 2000
(*Meeting No. 38*)

The Standing Committee on Industry met in camera at 9:40 a.m. this day, in Room 371, West Block, the Chair, Susan Whelan, presiding.

Members of the Committee present: John Cannis, Antoine Dubé, Marlene Jennings, Ian Murray, Werner Schmidt and Susan Whelan.

Acting Members present: Ivan Grose for Gerry Byrne, Jacques Saada for Dan McTeague and John Maloney for Jerry Pickard.

In attendance: From the Library of Parliament: Dan Shaw, Research Officer.

Pursuant to the Committee's mandate under Standing Order 108(2), a study concerning Productivity, Innovation and Competitiveness.

The Committee resumed consideration of the draft report.

On motion of Marlene Jennings, it was agreed, — That any dissenting opinions be limited to not more than four (4) pages at 12-point font size.

On motion of Marlene Jennings, it was agreed, — That any dissenting opinions be received in both official languages by the Clerk no later than Tuesday, April 4, 2000 at 4:30 p.m.

On motion of Marlene Jennings, it was agreed, — That the Committee authorize the printing of dissenting opinions of the Canadian Alliance, Bloc Québéçois and NDP as appendices to this report, immediately following the signature of the Chair.

Marlene Jennings moved, — That the draft report as amended be concurred in.

And the question being put on the motion was agreed to, on division.

On motion of Marlene Jennings, it was agreed, — That the Chair present the draft report as amended to the House at the earliest possible opportunity.

On motion of Marlene Jennings, it was agreed, — That pursuant to Standing Order 109, the Committee request that the Government table a comprehensive response to this report within one hundred fifty (150) days.

On motion of Marlene Jennings, it was agreed, — That the Chair be authorized to make such typographical and editorial changes as may be necessary without changing the substance of the draft report to the House.

On motion of Marlene Jennings, it was agreed, — That the Committee authorize the printing with distinctive cover of 1,500 English copies and 500 French copies of the report.

At 9:45 a.m., the Committee adjourned to the call of the Chair.

Richard Rumas
Clerk of the Committee